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ENVIRONMENTAL POLICY FRAMEWORK

Parish of St. Elizabeth, Jamaica

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ENVIRONMENTAL POLICY FRAMEWORK

ST. ELIZABETH

Draft submitted to

**NRCA's Protected Areas Management Branch and
USAID/Kingston**

by

**Alison Kenning Massa and Ann Haynes- Sutton
Technical Support Services, Inc**

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St Elizabeth Parish Council
St Elizabeth Environmental Protection Association
St Elizabeth Social Development Commission
Community Development Foundation
Malvern Science Resource Centre
South Coast Resort Board
National Environmental Societies Trust
St Elizabeth Service Clubs
Mr Michael Clarke

Ministry of Local Government and Works
Ministry of Agriculture
Division of Mines and Quarries
Fisheries Division
Town Planning Department
Tourism Product Development Company
Rural Physical Planning Unit
Jamaica Bauxite Institute
Jamaica National Heritage Trust

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Prepared by Alison Kenning Massa, Ann Haynes-Sutton and Tunde Aina, TSS Inc, with contributions from team leaders Lloyd Gardner and Brian Byfield, and team members Carla Gordon, Frances Blair, Winsome Townsend, Nicole Smith, NRCA, Jacqueline Grant and Toby Shillito, TSS, and Paulette Griffith-Jude, NEST

Prepared for

NRCA Learie Miller, Deputy Executive Director for Conservation and Protection, and the Protected Areas Unit
 Carla Gordon, Director, Frances Blair, Brian Byfield, Christine Sutherland, and
USAID Greg Booth, Project Officer

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LIST OF ACRONYMS

BR	Black River	NWC	National Water Commission
BRLM	Black River Lower Morass	ODPEM	Office of Disaster Preparedness and Emergency Management
BRUM	Black River Upper Morass	PARC II	Protected Areas Resource Conservation Project
CBO	Community-Based Organization	PCA	Pesticide Control Authority
CDF	Community Development Foundation	PCJ	Petroleum Corporation of Jamaica
DEMO	Development of Environmental Management Organizations	PIF	Project Information Form
EFJ	Environmental Foundation of Jamaica	PIOJ	Planning Institute of Jamaica
EIA	Environmental Impact Assessment	PVO	Private Voluntary Organization
ENGO	Environmental Non-Governmental Organization	PWD	Public Works Department
EPF	Environmental Policy Framework	QUANGO	Quasi Non-Governmental Organization
FSCD	Forest and Soil Conservation Department	RADA	Rural Agricultural, Development
GEF	Global Environmental Facility	RPPU	Rural Physical Planning Unit
GOJ	Government of Jamaica	SCRB	South Coast Resort Board
IUCN	International Union for the Conservation of Nature	SDC	Social Development Commission
JAS	Jamaica Agricultural Society	SEEPa	St Elizabeth Environmental Protection Association
JB1	Jamaica Bauxite Institute	SPAW	Specially Protected Areas and Wildlife Protocol
JCDT	Jamaica Conservation and Development Trust	SRC	Scientific Research Council
JCF	Jamaica Constabulary Force	STATIN	Statistical Institute of Jamaica
JDF	Jamaica Defence Force	STRAP	Sea Turtle Recovery Action Plan
JET	Jamaica Environment Trust	TPD	Town Planning Department
JPSCo	Jamaica Power Supply Company	TPDCo	Tourism Product Development Company
JNHT	Jamaica National Heritage Trust	UDC	Urban Development Corporation
LAC	Local Advisory Committee	UNCED	United Nations Conference on Environment and Development
LGRU	Local Government Reform Unit	USAID	United States Agency for International Development
LME	Local Management Entity	USDA	United States Department of Agriculture
LDUC	Land Development and Utilization Commission	UTECH	University of Technology
NEEC	National Environmental Education Committee	UWA	Underground Water Authority (now WRA)
NEST	National Environmental Societies Trust	UWI	University of the West Indies
NGO	Non-Governmental Organization	WIWD	West Indies Whistling Duck
NIC	National Irrigation Commission	WRA	Water Resources Authority
NRCA	Natural Resources Conservation Authority	WTO	World Trade Organization

Preface

The Natural Resources Conservation Authority (NRCA) has recently initiated the preparation of Environmental Policy Frameworks (EPFs) as a means of planning for the sustainable management of environmentally sensitive areas. An EPF brings together all those with an interest in or responsibility for the quality of such an area. These stakeholders include individuals, formal and informal interest groups, residents, public agencies, landowners, developers and other private sector interests.

The EPF process provides a mechanism for arriving at consensus among these varied groups on policies and actions for managing the area's environment by

- Documenting the main objectives and actions needed to ensure the improvement and maintenance of the area's ecological integrity,
- Formulating policies and action plans for whole watersheds or ecosystems within which protected areas may be declared, providing greater control over activities influencing potential protected areas,
- Establishing the basis for declaring protected areas and developing protected area management plans

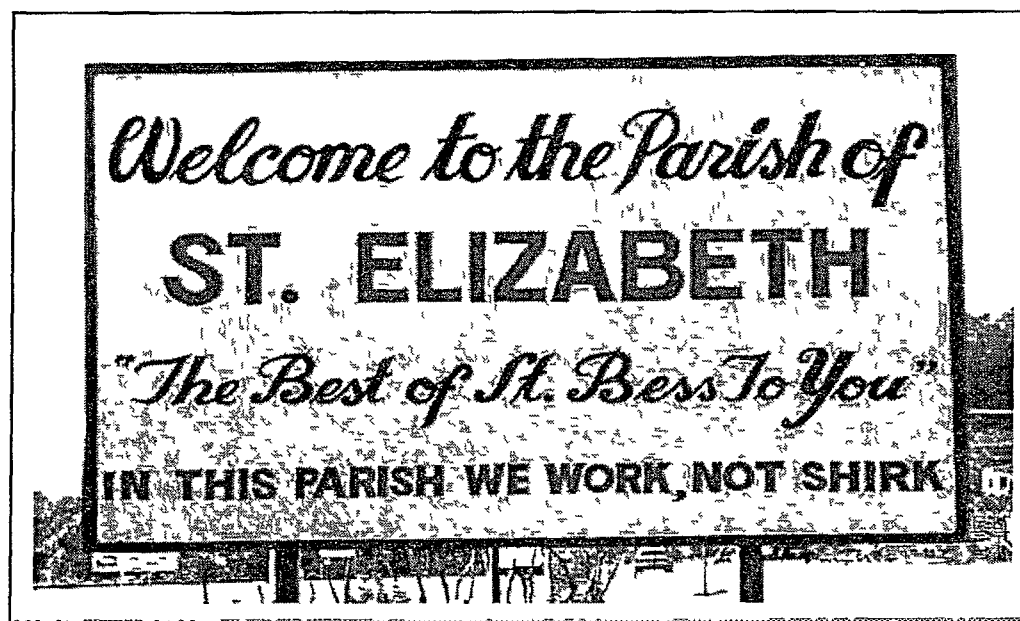
Significant steps in the EPF process include

- Identifying stakeholders and assembling available knowledge and stakeholder values and perspectives about the area,
- Initiating formulation of environmental policies necessary to ensure sustainable development of critical resources,
- Developing coordinated approaches to planning, surveillance, monitoring, data collection and sharing of information about areas of common interest, such as water quality, land use, socio-economic impacts of resource extraction, and eco-tourism,
- Arriving at consensus among responsible government entities and other stakeholders regarding priority issues and their resolution,
- Developing a model for stakeholder collaboration through an Action Agenda that identifies priority environmental objectives and collective or coordinated projects for mitigating environmental stress and improving resource use practices,
- Formulating incentives, guidelines and other tools to promote voluntary compliance with environmental laws, regulations, and standards,
- Developing cooperative management arrangements among government agencies, non-government organizations, and private interests for planning and conservation efforts, and
- Integrating overall development plans for the EPF area and/or proposed protected areas with NRCA's programs, projects and activities

This draft EPF has been prepared as the basis for stakeholder discussion and planning for improved management of the valuable resources of the parish of St Elizabeth. The people of St Elizabeth, known for their resilience, self-respect, ingenuity and hard work, have traditionally been effective caretakers of the natural and productive resources of the parish. Unfortunately, a number of serious changes in the environment, in the broadest sense, are threatening to undermine the ability to maintain this stewardship. Some of the most urgent threats are

- Fragmented and counter-productive policies affecting agriculture,
- The potential expansion of bauxite and limestone mining in inappropriate locations,
- A local vision of sustainable, community-based tourism that is not yet shared nationally,
- Insufficiently comprehensive analysis of the suitability of sites for new housing,
- Lack of enforcement and prosecution of environmental breaches and crimes, and
- Poor enforcement of drug-related laws

These threats, increasing levels of unemployment, underemployment and poverty, and less frequent use of environmental sustainable practices in agriculture, fisheries and forestry are intricately related. This document aims to identify critical links and to lay the basis for actions and interventions that can lead once more to balance and sustainable prosperity for the parish.



Sign at Gutters, St Elizabeth

1 INTRODUCTION

1.1 The Concept of the Environmental Policy Framework

The Natural Resources Conservation Authority (NRCA) has recently initiated the preparation of Environmental Policy Frameworks (EPFs) as a means of planning and sustainably managing areas of high environmental sensitivity. An Environmental Policy Framework sets out the guiding principles needed to ensure the improvement and maintenance of the ecological integrity and general environmental quality of such areas. The process takes a whole-ecosystem approach by addressing a broad area, parish or watershed so that important linkages and the surroundings of sensitive areas, including potential protected areas, may be addressed.

An EPF pulls together the interests and responsibilities of all those with a stake in the environmental quality of the area.

Stakeholders include individuals, formal and informal interest groups, residents, private sector interests including registered companies, landowners, developers, resource users, public sector agencies and others with interests in or responsibility for the area, non-governmental organizations (NGOs) and community-based organizations (CBOs). The EPF process provides a mechanism for arriving at consensus among these varied groups on policies, approaches to collaboration and action plans for managing and improving the area's environment and ecological integrity.

The EPF process should lead to

- a A statement of policy showing how the EPF fits into environmental planning for the country and/or region,
- b Policy guidelines for shaping future plans and actions, and
- c A clear framework for action and continuing collaboration

BOX 1 OBJECTIVES OF THE ENVIRONMENTAL POLICY FRAMEWORK DOCUMENT

Key objectives of an EPF document are to

- *Identify stakeholders and express values, perspectives and commonly-held objectives for the EPF area*
- *Record and integrate available knowledge about the value and condition of the area's ecosystems and resources*
- *Examine the effectiveness of current environmental regulations and enforcement and recommend appropriate review and overhaul*
- *Identify practical actions to remedy the negative effects of poor environmental and resource use practices*
- *Coordinate stakeholder activities within the context of common objectives and plans*
- *Provide an important part of the foundation of future development plans on a watershed-wide basis and*
- *Lay the basis for declaring and planning future protected areas within the context of whole watersheds*

1.2 The Need for an Environmental Policy Framework

Improved environmental management has important direct and indirect benefits for government and for private interests and individuals. Land use planning, the selection of sites for new developments, such as hotels, and housing schemes, and the design of such projects all need to take account of the relative suitability of particular areas for different uses. **When planners, landowners and developers listen to what the land tells them, they are rewarded with lower development and operating costs, increased safety from hazards, such as floods, mudslides or polluted air or water, and enhanced project amenity, with greater profits for the promoter and greater returns to the economy.**

The three objectives, reduced development costs, resident and development safety, and increased project amenity and value, represent an indirect but very effective approach to improved environmental planning and management. Achievement of these objectives requires a systematic understanding of the environment (land, water and natural resources and social, cultural and economic conditions). It also requires a creative response that recognizes the assets of an area as opportunities and avoids threats or constraints to development, where possible using them as opportunities to create a better plan. This type of creative interaction with the environment used to be instinctive or intuitive. Examples of settlements and sustainable use of resources in harmony with or creatively adapted to natural conditions abound in Jamaica and throughout St Elizabeth. Unfortunately, many of these examples tend to be historical, rather than recent. Numerous factors, including "improved" technology (bulldozers, chainsaws and outboard engines, for example) and pressures introduced by a globalizing economy, have weakened the instinctive link to the environment. **The most important factor has undoubtedly been lack of collaboration among the residents of local communities, government agencies and private developers in deciding how to use the land and resources.**

A number of examples can be cited to illustrate the benefits of greater collaboration among the NRCA, other government agencies and organizations with the capacity to influence the environment. In 1997 the Tourism Product Development Company (TPDCo) carried out a study of the Black River's carrying capacity. This created an opportunity for the NRCA to collaborate in implementing the study.

St Elizabeth contains possibly the country's largest concentrations of natural resources. Many resources are of international as well as national importance. They include Jamaica's largest wetland system containing numerous endemic species of plants and animals,¹ the largest peat deposit, the most productive agricultural area in Jamaica and perhaps the largest concentration of unspoiled natural and heritage sites to support an emerging tourism industry. In addition, the parish is the site of some of the country's largest agricultural and industrial projects (both successful and unsuccessful) and has extensive reserves of bauxite and rare materials such as silica sand.

Many resource-based activities have taken place at substantial cost to the environment and the quality of life. These and some proposed developments threaten to further degrade the quality and sustainability of this unique area. The NRCA has been mandated to "take such steps as are necessary for the effective management of the physical environment of Jamaica so as to ensure conservation, protection and proper use of its natural resources." The NRCA wishes to assist the parish with establishment of a clear, coordinated and effective approach to planning and environmental protection. By involving all stakeholder groups, the EPF can guide formulation of policy to reconcile competition for natural resource use, a cooperative program of environmental improvements, and a strategy for sustainable development. The NRCA is also working with local and national interests to prepare an application for including part (or parts) of the area in the national system of protected areas.

¹ The Black River Lower Morass was declared a Ramsar Site in February 1998. see Section 2.1.5

1.3 The EPF Document and Process

Outline of the Document A draft EPF document is intended to use existing information and local perspectives to facilitate decisions on enforcement of regulations, pragmatic solutions to existing and anticipated issues and coordination of stakeholder and institutional improvement actions. Stakeholders include the NRCA, other government agencies, local government, non-governmental organizations (NGOs), community-based organizations (CBOs), resource users and other interests. The final EPF should outline the information necessary to facilitate the area's protection and form an important part of the foundation of future development plans.

This draft EPF is presented in two volumes. Volume I contains background information on the environmental setting, types and sources of threats to the environment and opportunities for environmental improvement and sustainable activities, a discussion of alternative visions, and a review of environmental organizations and environmental management models and capacity. Volume II provides a Draft Action Plan and Review Schedule.

Geographic Area The physical area covered by this EPF is the Parish of St. Elizabeth. The parish includes most of the Black River Watershed (Figure 1), the second largest in Jamaica. The watershed also includes portions of St. James, Trelawny, Manchester and Westmoreland. For practical reasons the EPF cannot address these areas directly. However, protection of the Cockpit Country is critical to protection of the Black River Morass.² The EPF addresses the Morass and the coastal areas from Luana Point to Parrottee Point in the greatest detail because of their complexity.

For the purposes of the EPF, the parish has been divided into bio-social regions (Figure 2) that have some homogeneity in terms of

topography, ecosystems and human activities. From the west, the regions are the Luana-Font Hill coast, the Newmarket plateau on the border of Westmoreland, the Black River Lower Morass, the YS Corridor connection with the Cockpit Country, the Lacovia Mountains, the Nassau Mountains and Nassau Valley, the Black River Upper Morass, the Essex Valley, the Santa Cruz Mountains and, in the south, Alligator Pond, Pedro Plains and Burnt Savanna and the Treasure Beach to Lovers' Leap coast. These divisions are used in the description of environmental conditions in Chapters 2 and 3 and elsewhere in the text when appropriate to make area-specific recommendations. Conditions are summarized in Annex H.

The EPF Process The EPF process allows stakeholders to examine options for environmental planning and natural resource management, identify opportunities for sustainable development through coordinated public-private initiatives and develop a context for the establishment of protected areas. Participants in the process have been encouraged to contribute knowledge, ideas and observations throughout the process. This draft document offers a further opportunity to contribute and comment. As stakeholders become active in environmental management policy for their area, the EPF process aims to

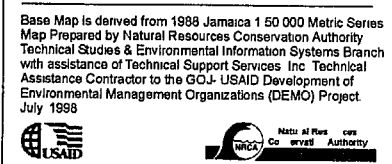
- Examine the need for central and local government, NGOs and others to work in partnership for environmental protection and sustainable resource use,
- Identify the need for further planning, research and monitoring,
- Identify public interest lands, waters and resources
- Increase public awareness and discussion of the local environment,
- Identify a collective vision of sustainable development and priority actions and responsibilities,
- Coordinate planning, development and environmental protection activities, and
- Identify local environmental management organizations and ways in which they may become more effective

² Other programs such as the NRCA's Watershed Management Program and a GEF-funded program for Cockpit Country will address these areas.

BOX 2 PRODUCTS OF THE ENVIRONMENTAL POLICY FRAMEWORK PROCESS*Significant products of the EPF process include*

- Identifying stakeholders and assembling available knowledge and stakeholder values and perspectives about the area
- Initiating development of environmental policies that are necessary to ensure sustainable development of critical resources
- Developing coordinated approaches to planning, surveillance, monitoring, and data collection, or, at a minimum, sharing of information about areas of common interest such as water quality, land use, socioeconomic impacts of resource extraction, and ecotourism),
- Arriving at consensus among responsible government entities and other stakeholders regarding priority issues and approaches to their resolution
- Developing a model for stakeholder collaboration in designing an Action Agenda that identifies priority environmental objectives and appropriate projects for mitigating environmental stress and improving resource use practices, to be achieved through the collective collaboration and commitments of stakeholders,
- Formulating incentives, guidelines and other tools which promote voluntary compliance to development and resource use laws, regulations, and standards,
- Initiating cooperative management arrangements among government agencies, non-government organizations, and private interests for planning and conservation efforts (especially in the areas of Protected Area management, resource management), and
- Ensuring integration of the plans and activities of local organizations, the NRCA and other government agencies into development plans for the EPF area and management plans for any proposed protected areas

The EPF process enables all stakeholders to participate in the planning and management of Jamaica's most valuable and environmentally sensitive areas and provides critical information necessary for the successful planning of a national system of protected areas

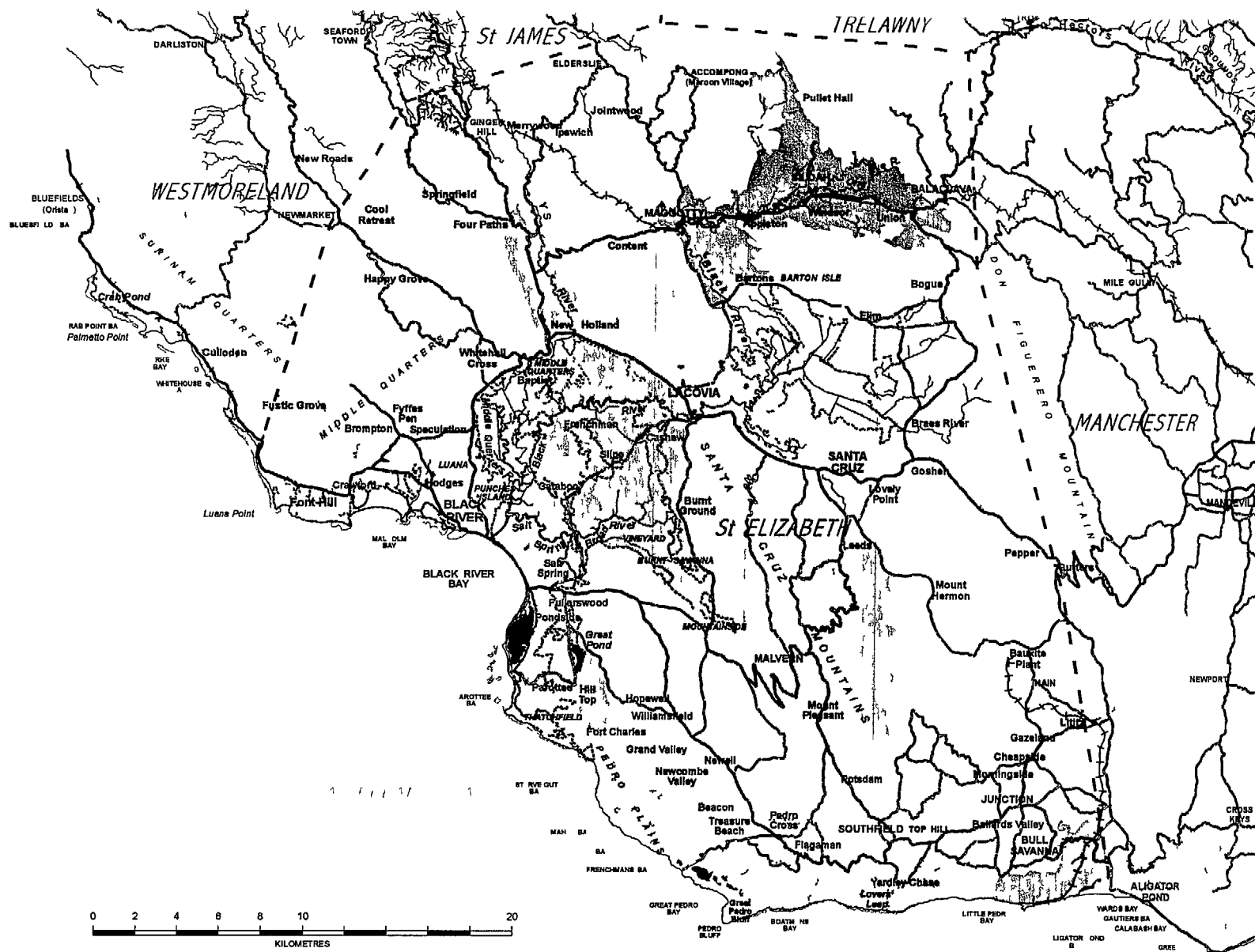


ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

**Figure 2
Biosocial Units**

LEGEND

- Morass / Wetland
- Mangrove
- Parish Boundary
- Road Class A
- Road Class B
- Road Class C
- Railway
- Seasonal Gullies & Drainage Features
- Small Rivers & Streams
- Large Rivers
- Ponds
- ALLIGATOR POND
- BLACK RIVER LOWER MORASS
- BLACK RIVER UPPER MORASS
- ESSEX VALLEY
- LACOVIA MOUNTAINS
- LUANA & FONT HILL
- NASSAU MOUNTAINS
- NASSAU VALLEY & MAGGOTTY
- NEW MARKET PLATEAU
- PEDRO PLAINS & BURNT SAVANNA
- SANTA CRUZ MOUNTAINS
- SOUTHERN COCKPIT COUNTRY
- TREASURE BEACH & LOVERS LEAP
- YS CORRIDOR



Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services Inc. Technical Assistance Contractor to the GOJ- USAID Development of Environmental Management Organizations (DEMO) Project. July 1998



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2 BACKGROUND ON PLANS, PROJECTS AND ACTIVITIES UNDERTAKEN IN ST ELIZABETH

2.1 Past and Recent History

The abundance of the marine and wetland resources along its coast and the fertile soils in its inland valleys has for centuries attracted people to St Elizabeth. At the many Taino sites in the south around the Pedro Ponds, for example, the characteristic motifs of the Redware culture suggest dependence on marine resources. Around 1508 the Spanish attempted to establish their first base (called Oristan) at Parottee Point before moving to Bluefields in 1519. Later the Pedro Plains formed one of the large Spanish hatos (ranches).

The combination of St Elizabeth's long settlement history and the variety of its soils and resources have created a mix of small- and large-scale patterns of land ownership that are reflected in the bio-social regions. For example, after the British took over Jamaica, parcels of land in the Pedro Plains were distributed to the soldiers and some places still bear names that could have originated in this period (e.g. Ballard's Valley). The fertile plains in the center of the parish were consolidated in the 18th and 19th centuries into large and prosperous sugar estates, some of which, such as Appleton and Holland, still survive. However, in much of southern St Elizabeth the land was unsuitable for sugar cultivation and remained in the hands of smallholders.

The extensive cultivation of logwood, introduced in 1715, formed the basis of the dye-wood industry which brought temporary prosperity to the area in general and the town of Black River in particular. In 1893–4 logwood was Jamaica's most valuable export but the industry collapsed in the early C20th following the development of synthetic dyes. In other places large cattle pens were formed, breeding, as St Elizabeth does today, some of the best cattle and horses in Jamaica.

Outside the plains and savannas, subsistence occupations were common. Around the swamps small pens survived on a mixture of agriculture, lumbering, hunting and fishing, a pattern that has continued in modified

forms. The Cockpit Country in northern St Elizabeth, includes the historic settlement of Accompong, a stronghold of Maroon culture. Here land use still follows the traditional pattern of slash and burn cultivation on the fertile bottomlands of the cockpits, augmented by lumbering, livestock rearing and hunting.

2.1.1 Past and Proposed Comprehensive Plans

Over the last thirty years there have been many attempts to influence land use and economic development through national, regional and local planning (Table 1). Many of these plans have contained excellent recommendations, discussed in Section 2.3 but these have either not been implemented or have had little real effect. There are many reasons for this, none of them peculiar to St Elizabeth. Indeed St Elizabeth is unique in that it is the only parish in which citizens have come together to create their own plan (St Elizabeth Homecoming Foundation Seven-Year Development Plan).

It is not difficult to identify the reasons for failure. In the past most plans were prepared in Kingston with no consultation with local residents. The plans were not widely circulated and many stakeholders probably were unaware of their existence. This combined with a general feeling among rural Jamaicans that they have very little influence over their surroundings. It is to be hoped that this is changing. The blossoming of the NGO movement has contributed to increased awareness and participation elsewhere in Jamaica. Several on-going exercises include public consultations (South Coast Sustainable Development Plan and Tourism Master Plan) and it is to be hoped that this will encourage people to identify with the plans to a greater extent.

Issue 1 The people of St. Elizabeth have not been sufficiently involved in planning, and many do not feel able to influence the process

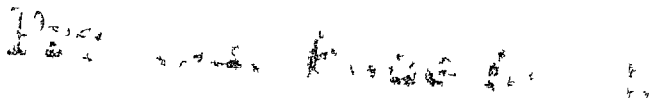


TABLE 1 NATIONAL AND REGIONAL PLANNING

PROJECT	PREPARED BY	SCOPE	MAIN RECOMMENDATIONS	CURRENT STATUS
National Physical Plan 1978-1998 (TCPD)	TCPD	Sectoral recommendations at national level	Large inland conservation areas at Black River upper and lower morasses Small inland conservation areas at Luana/Font Hill and Pedro Ponds	No action
St Elizabeth Development Order 1983 (TCPD--Figure 3)	TCPD	General recommendations for parish	Very general recommendations include a conservation area including Black River lower and upper morasses, Nassau Mountains, Cockpit Country and coastline from Treasure Beach to Black River and at Font Hill	No action
SW Coast Development Plan (1996) UDC	UDC	Black River to Savanna-la-Mar	Practical suggestions for overall development strategy, detailed recommendations for sectors	Not adopted but some action
Seven Year Development Plan	St Elizabeth Homecoming	General recommendations for parish	Seeks to enhance economic growth, maintain natural beauty and increase quality of life while protecting the natural and built environment	No action
South Coast Sustainable Development Plan	TCPD, 1998	Hellshire to Green Island Coast	Seeks to identify natural resources and develop strategy for "sustainable" development	Ongoing
Tourism Master Plan (1998)	JTB	Islandwide	Seeks to involve local residents in development of strategy for tourism	Ongoing
Plan for a System of Protected Areas for Jamaica	JCDT/NRCA (USAID funds)	Islandwide	Identified areas in need of conservation, examined selected areas in detail (including Black River and Cockpit Country)	Transferred to NRCA -- (DEMO) Ongoing
Environmental Policy Framework (EPF)	NRCA (USAID)	Parish of St Elizabeth	Identifies a framework for collaborative action to address the principal environmental threats and opportunities before the parish	Ongoing

The institutional framework of government responsibility for implementation of plans is complex. With at least twenty government or quasi-government agencies (discussed below in Section 6.1.2 and Table 24) operating under numerous laws in the parish, it is hardly surprising that many agencies prefer to pursue their own mandates without reference to plans. The NRCA Act (1991) gives the NRCA the opportunity to overcome this problem and provide leadership and coordination. Greater transparency and coordination would discourage

ad hoc political decisions that over-ride development plans. It would also reduce corruption and cynicism and encourage participation in local management.

Issue 2 There are many government agencies, sometimes with conflicting mandates that are themselves subject to political expediency. Coordination is difficult. This encourages agencies to proceed independently and to ignore central or regional plans.

2 1 2 Conservation Plans and Proposals

Designated conservation areas in St Elizabeth (Table 2 and Figure 3) include Forest Reserves (managed by the Forestry and Soil Conservation Department), Game Sanctuaries managed by NRCA and Protected National Heritage sites managed by the Jamaica National Heritage Trust (JNHT). In no case does legal designation contribute significantly to protection. Private conservation areas, such as YS Falls and Font Hill, have tended to fare better. (Unfortunately, recent actions by the Petroleum Corporation of Jamaica (PCJ) at Font Hill Beach have not lived up to the quality of previous plans for the protection of this important area.)

Issue 3 Protection without enforcement is not sufficient to ensure maintenance of protected areas and sites

The importance of the creation of protected areas in St Elizabeth is a common theme in all the development plans and studies for proposed development projects for the area. Protection of Black River Lower and Upper Morasses was first suggested in the 1960s¹ and has been proposed many times since then (Table 3 and Figure 5). Similar recommendations have been included in almost every sectoral report or study in the area, including agriculture, mining, and tourism as well as reports from local and international conservation agencies.

An important opportunity was missed when Blue Mountains / John Crow Mountains and Montego Bay were chosen as the sites for the first national and marine parks in Jamaica. Many local people felt at

the time that Black River was the ideal place to develop a demonstration project for national parks and to work out some of the institutional and social problems. At the time there were no large boat operators on the river. Profits from boat tours and related activities for tourists could have contributed greatly to running the park. The development of Black River could have been an integrated process, proceeding with the consensus of stakeholders. If this idea had been followed up many of the ecological and social problems now facing potential protected area managers could have been avoided.

Issue 4 Economic development (especially tourism) should not be allowed to precede conservation in a proposed protected area.

Luana/Font Hill and Parrotte Ponds have been proposed for protection. Some proposals suggest that they should be independent, others that they should be integrated into a Black River protected area because of their ecological linkages. Luana/Font Hill has received some protection from the Petroleum Corporation of Jamaica (PCJ) but plans for a crocodile farm/reserve were turned down and detailed recommendations for a wildlife sanctuary (including trails and an interpretive center) have not been implemented.

Further east, proposed protected areas include Pedro Ponds and Pedro Bluff. An attempt to protect Great Pedro Pond by consensus in the early 1980s failed because one landowner involved did not cooperate. No proposals have yet been made for protection of the Santa Cruz Mountains although local residents favor such action and the mountains have unique value ecologically and as a backdrop to the Lower Morass.

Issue 5 The recent history of protected area development in Jamaica shows that areas with strong advocates are more likely to receive funding. So far no strong advocates have come forward to champion the case of St Elizabeth.

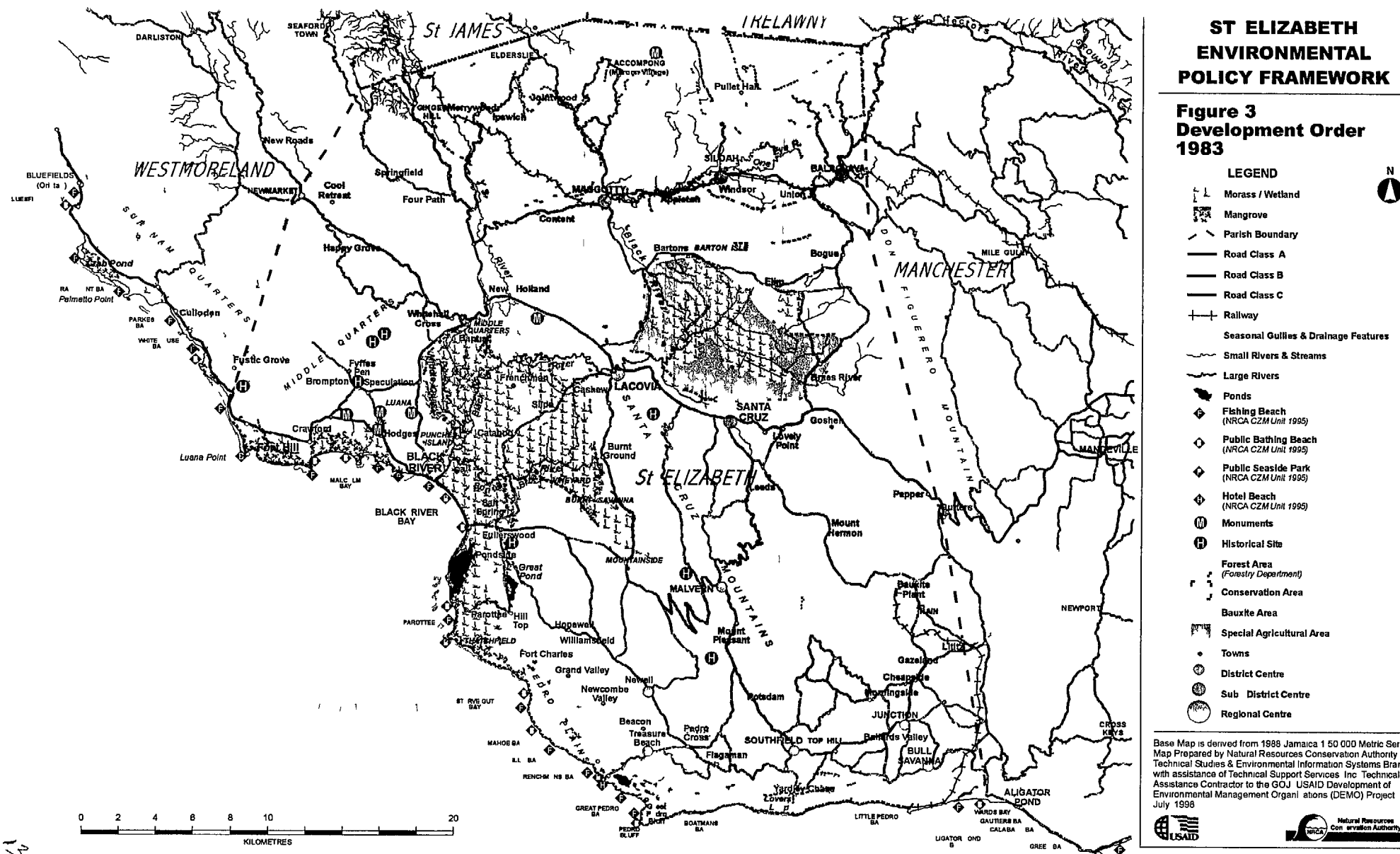
¹ As discussed in Section 2 1 3 many schemes for exploiting the Lower Morass for mining or agriculture have been proposed but proven infeasible. Those proposals included investigations in the early 1960s and again in the early 1980s of the potential for mining peat for fuel (Grontmij 1964 NRCD 1981) and recommendations for the drainage of the Lower Morass to irrigate the Pedro Plains (1973). These studies all concluded that the best use of the area would be as a national park.

TABLE 2 EXISTING CONSERVATION AREAS - NATURAL ENVIRONMENT

NAME OF AREA	TYPE OF PROTECTION	DESCRIPTION OF AREA	CURRENT STATUS
Cockpit Country Forest Reserve	Forest Reserve Forest Act, prohibits extraction of timber without license, FSCD NB Forest Reserves are Game Sanctuaries under the Wild Life Protection Act automatically	Very large reserve stretches into Westmoreland and Trelawny Regional offices in Elderslie and Quickstep	Little or no enforcement
Cook's Bottom Forest Reserve	As above	Small reserve south of Cockpits, near Arcadia, of some botanical importance	Little or no enforcement
Bogue Forest Reserve	As above	Small 276.5 acre reserve south of Balaclava contained primary forest in 1950s Current status unknown	Little or no enforcement
Fyffe & Rankine Forest Reserve	As above	2388 acres on border of Westmoreland	Little or no enforcement
Lovers' Leap Forest Reserve	As above	Small coastal reserve	Protected by inaccessibility
Shuna Forest Reserve ?	As above	1,132 acres in St Elizabeth	
Spring Vale Forest Reserve	As above	Small forest reserve above Middle Quarters	Enforcement poor Roadside sawmills suggest intense logging
Upper Morass	Game Sanctuary Wild Life Protection Act prohibits hunting NRCA	Wetlands between Elim and Newton	Little enforcement Illegal hunting continues
Lower Morass	As above	Wetlands of Lower Morass,	Little enforcement Illegal hunting continues
Great Morass (Parottee Ponds)	As above	Wetlands south of Black River	
Luana Font Hill	As above	Wetlands and woodlands between Crawford and Scotts Cove	PCJ employs wardens and recently "improved" Font Hill Beach
YS Falls	Private lands	Forests around YS Falls	Privately managed

ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

**Figure 3
Development Order
1983**



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TABLE 2 (Cont'd) EXISTING CONSERVATION SITES - MAN-MADE ENVIRONMENT

NAME OF AREA	TYPE OF PROTECTION	DESCRIPTION OF SITE	CURRENT STATUS
Ashton Great House	Protected National Heritage, no changes without approval, National Heritage Trust Act, National Heritage Trust	Great House, in use as hotel, restaurant	Some of the original character has been altered by modernization of the structure
Magdala House and Spa	As above	House built late 1900s on BR waterfront	
New Forest ruins	As above	Great House near Alligator Pond	
Spring Park	As above	Great House near Luana , residence of G W Gordon	
Hampstead Great House	As above	Great House near Newmarket	
Black River court house and offices	As above	Courthouse built c 1900 In use	Attractive structure Needs repairs and maintenance
Black River Police Station	As above	Old structures	Needs repairs and maintenance
Black River Spa	As above	Once attractive and popular spa with reputation for healing	Construction begun and abandoned Improvements needed
Lacovia Tombstone	As above	Historic tombstones on road beside gas station	Subject to graffiti Needs interpretation
Bamboo Avenue	As above, managed by Superintendent of Public Gardens	Bamboo lined road	Being taken over by squatters with stalls selling fruit and degraded by fire Control urgently needed

TABLE 3 PROPOSED CONSERVATION AREAS

PROJECT	DESCRIPTION	SUMMARY OF PROPOSALS	CURRENT STATUS
Black River National Park	Proposed protected area	<ul style="list-style-type: none"> Protected Area Grontmij report (1964), the report of the Wildlife Protection Committee (c 1968), in the National Physical Plans of 1970 and 1974, recommendations for the Pedro Plains irrigation project (Anon 1973), National Park Goodbody, 1969, Proctor, 1969, Smith 1969, NRCA & TGI, 1983, Garrick, 1983, Harvey, 1986 all studies carried out in the examination of peat mining feasibility (e g NRCD, 1981, Coke <i>et al</i>, 1982,, Bjork, 1983) and in many other reports and articles (e g Wade, 1984, Haynes, 1984, Bacon, 1987, GOJ, 1987, Aiken <i>et al</i> 1987, Fairbairn and Haynes, 1987) Also Gosse Bird Club, 1990, JCDD 1992, St Elizabeth Econ Devt Comm (1995) Spring (1995) World Heritage Site under the Convention concerning the World Cultural and Natural Heritage Site (Garrick,(1986) Managed Resource Protected Area NRCA (1997-8) 	Not implemented
Parottee Pond	Proposed protected area		Threatened by subdivision and coastal development
Luana/Font Hill Wildlife Sanctuary	Proposed wildlife sanctuary and crocodile farm	NRCA 1981 PCJ, current	Area fenced, wardens employed Charcoal burning, logwood extraction continue
Pedro Pond protected area	Proposed reserve	Proctor, 1969 NRCA	Not implemented Threatened by subdivision
Cockpit Country National Park	Proposed protected area	Proctor, 1969 JCDD, 1992	Not implemented GEF proposal being developed
Black River town	Proposed heritage area/National Monument	UDC 1991 JCDD, 1992 JNHT, 1997	Ongoing, explanation and models needed
Bamboo Avenue	Managed by Superintendent of Gardens (MA)	Apparent loosening of restrictions has led to large numbers of stalls being constructed	Ongoing

Figure 4 Existing Conservation Areas

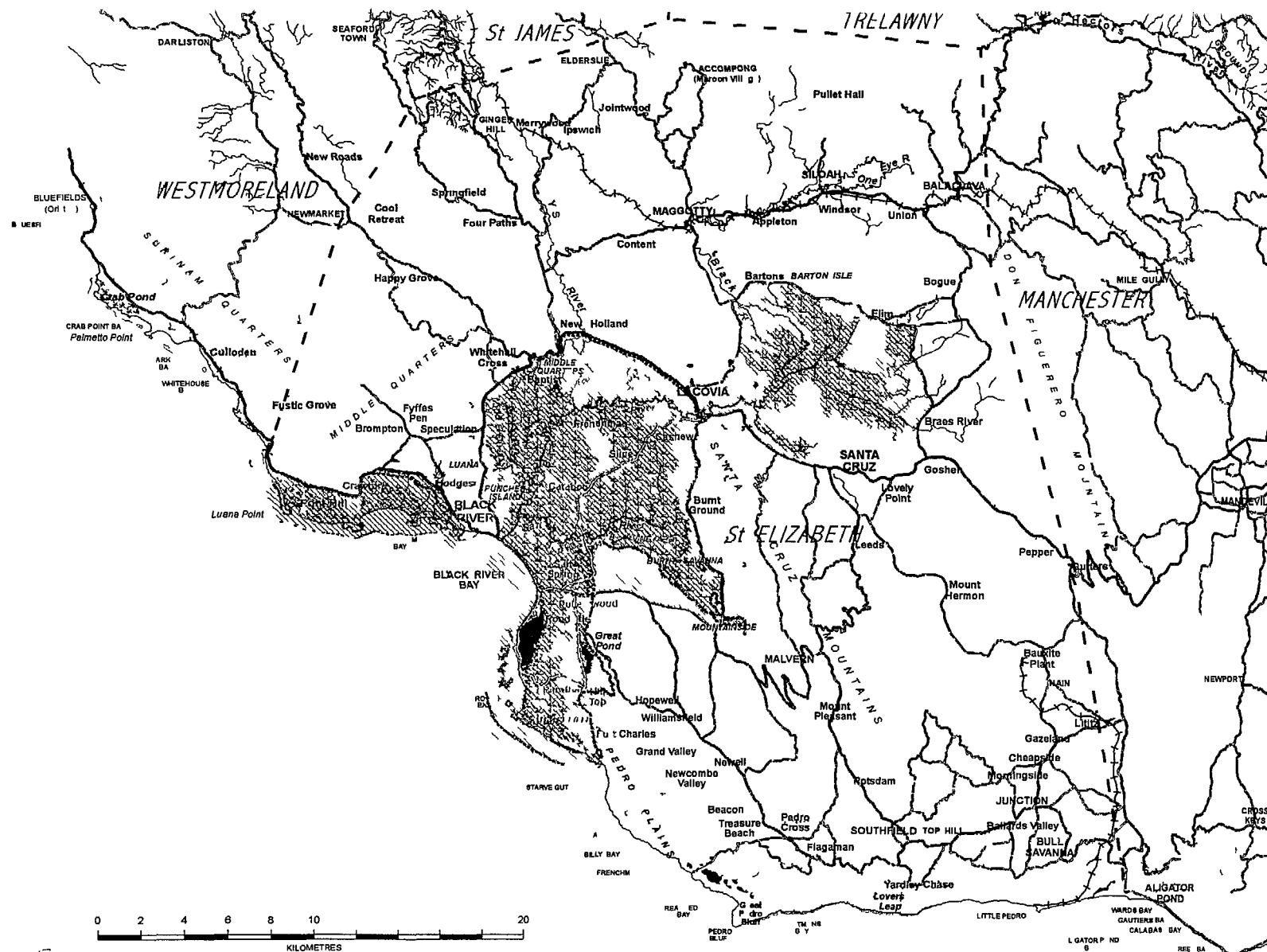


ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

**Figure 5
Proposed
Protected Areas**

LEGEND

- Morass / Wetland
- Mangrove
- Parish Boundary
- Road Class A
- Road Class B
- Road Class C
- Railway
- Seasonal Gullies & Drainage Features
- Small Rivers & Streams
- Large Rivers
- Ponds
- Proposed Black River National Park (JCDT Systems Plan 1992)
- Proposed Black River Managed Resource Protected Area (NRCA April 1997)
- Proposed Hodges/Font Hill Protected Area (Classification & boundary under review)



Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services, Inc. Technical Assistance Contractor to the GOJ. USAID Development of Environmental Management Organizations (DEMO) Project July 1998



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2.1.3 Major Development Proposals and Projects

A number of large projects have been proposed for St Elizabeth in the past. Implementation of some, such as drainage, rice production and irrigation in the Upper Morass, resulted in significant deterioration of the wetland system. Looking back, these past proposals can be classified as

- potentially destructive of the environment but deemed unsuitable or infeasible and not approved,
- potentially damaging to the environment but implemented,
- potentially damaging to the environment, implemented but failed,
- potentially damaging to the environment, approved and only now being implemented, and
- environmentally benign but not approved or not implemented

Agriculture

The recent history of St Elizabeth is replete with failed large government-led agricultural projects, while the greatest success has been small-scale and community-based - the dryland farming on the Pedro Plains. The most destructive and costly was the attempt to cultivate rice for local consumption in the Black River Upper Morass. Huge amounts of money were spent on this project and the ecology of a large area was radically altered before it was abandoned as uneconomical. Despite this history, large projects continue to be politically attractive, and irrigation and drainage projects are still under consideration. Meanwhile the survival of the farmers of the Pedro Plains is threatened by changing agricultural policy in response to the WTO requirements (as discussed later in this document).

Issue 6 Mechanisms are needed to ensure the input of local knowledge in developing and reviewing the feasibility of proposals before they are implemented.

Previous Peat Plant:

Mining and Heavy Industry

Bauxite The boom in the aluminium industry in Jamaica encouraged Revere to construct an alumina plant near Maggotty, which went into operation in 1971. Mining began but transportation costs proved prohibitive once the nearest reserves had been mined and the plant was abandoned. Mining of the Santa Cruz Mountains is under consideration but has been unanimously opposed by local residents in a recent poll (Malvern Science Resource Centre, 1998).

Issue 7 Decisions to undertake mining need local input and full public review of costs and benefits

Peat Following the oil crisis of the 1970s the GOJ became interested in exploitation of Jamaica's only known major fuel reserve - peat resources of the Negril and Black River morasses, among others. This was encouraged by international interest in using Jamaica to develop a technology that could then be applied in many other places. Environmental impact assessments of proposed peat mining led to the most in depth studies ever undertaken of Jamaican wetlands (and many recommendations for protection of Black River) before the plans were finally abandoned on economic grounds.

Limestone There are 10 legal limestone quarries in St Elizabeth. The Mines and Quarries Division has identified large reserves of high grade limestone and whiting and plans have been developed to export the mineral from a new terminal to be developed at Black River or Scotts Cove. A proposal to reuse the Revere works at Maggotty as a cement factory to supply western Jamaica was approved in 1996.

Issue 8 Despite the visually intrusive nature of limestone quarries their licenses do not include requirements to minimize the effects during mining or rehabilitate sites after use

Issue 9 Selection of the port for limestone export should be based on a comprehensive and publicly reviewed assessment of the economic and environmental costs and benefits of each option

Silica Sand West Indies Glass mines silica sand near Hodges. Some two years ago their business was expanding and sand was being mined on the fringes of the morass. However the introduction of PET bottles has reduced the demand for glass and the company has cut back production.

Issue 10 Changes in the Mines and Quarries Act have reduced NRCA's role in the approval process for mines and quarries. There is no requirement to consider loss of options as a result of mining and no recognition that tourism and mining are broadly incompatible as major development strategies for the same area except in the context of very careful and coordinated planning.

Tourism

Wherever there is a white sand beach there is a strong temptation for developers to think of mass tourism and propose large developments, including hotels.

Issue 11 The special nature and attractiveness of the area, its sensitivity and low carrying capacity have been generally recognized. However no practical suggestions have been made about how to conserve the special attributes of the area. In particular the absence of a strong planning process means that land use conflicts are not adequately addressed.

Infrastructure and Housing

There are needs for improved roads and utilities and for improvement and expansion of the housing stock. However, the Public Works Department has undertaken work on roads in support of tourism development (but without the guidance of an approved and up-to-date plan) while roads on which many farmers rely remain in poor condition. Provision of piped water has been diverted to fields, limiting availability to legitimate domestic users and potentially upsetting traditional practices for the protection of fertility in dry conditions. The rural electrification program is having aesthetic

impacts on the countryside. Sites for housing schemes to address national needs have been selected on land that is not always best suited to the introduction of new settlement and sometimes potentially unsafe.

Issue 12 Responses to infrastructure and housing needs can have unexpected consequences if not carried out in accordance with a comprehensive and integrated plan.

TABLE 4 DEVELOPMENT PROPOSALS AND PROJECTS AGRICULTURAL PROJECTS

PROJECT	DESCRIPTION	ACTUAL IMPACTS	POTENTIAL IMPACTS	CURRENT STATUS
Black River Upper Morass Drainage (1984)	In order to increase rice production the Upper Morass was dyked	Natural ecosystems altered Lower morass less protected from siltation Dykes used by ganja planes		Not economically viable Abandoned
Black River Lower Morass Drainage and Irrigation (1985)	Plan to increase agricultural land (especially rice) and Pedro Plains through dyking and irrigation ditches	Not implemented	Increased salinization of soils Loss of biodiversity	Not implemented
Luana/Font Hill Exotic Fruit Orchards	Land cleared Plantations of mangoes and ackee, drip irrigation system installed	Attractive guango savanna bulldozed Risk of agricultural chemicals reaching wildlife reserve and sea		Abandoned following change of government
Southfield agricultural packing station	Facility for canning and processing	Plant constructed but not used		Never used
Fish farming - Black River Upper Morass	Extensive fish farm	Risk of introduction of exotic species Pollution of river with fish residues and chemicals		On-going
Frog legs - Black River	<i>Rana catesbiana</i> introduced	Frog established Effects on ecosystem not known		Jamaicans do not eat frog
Lobster farming	Proposed for Malcolm Bay location		Effects would most likely have been positive	Not approved

TABLE 4 Cont d DEVELOPMENT PROPOSALS AND PROJECTS MINING AND HEAVY INDUSTRY

PROJECT	DESCRIPTION	ACTUAL IMPACTS	POTENTIAL IMPACTS	CURRENT STATUS
Revere Bauxite mines and plant	Plant constructed to process bauxite Mining and processing	Lands around Maggotty mined but not rehabilitated Landscape degraded Leaching of chemicals from plant and waste sites into groundwater		Abandoned
Aggregates and whiting	Plans to export from Black River or Scotts Cove		Scarring of hillsides Traffic, noise and dust on roads Disruption of aquifers Incompatibility with tourism	Undecided
Peat - Black River Lower Morass	Plans to mine peat for fuel or horticulture		Transformation of BRLM Possible hydrological impacts Loss of biodiversity Loss of options	Not implemented
Limestone for cement	Plans to construct a cement plant at Maggotty to supply western Jamaica		See aggregates above	Not yet implemented
Oil refinery	Plans to construct a port and limestone refinery at Luana/Font Hill		Loss of biodiversity Risk of accidents, oil spills Pollution of air competition for water	Abandoned

TABLE 4 Cont d DEVELOPMENT PROPOSALS AND PROJECTS TOURISM

PROJECT	DESCRIPTION	ACTUAL IMPACTS	POTENTIAL IMPACTS	CURRENT STATUS
Luana/Font Hill Hotel	Plans to construct a hotel, # rooms unknown	N A	Social impacts, Loss of biodiversity, Coastal pollution	Abandoned
Luana/Font Hill Greyhound Track and Theme Park	Details unknown			Unknown
Luana/Font Hill	Construction of something (what??)		Risk of exceeding carrying capacity of beach	Ongoing
Lover's Leap - radar station	A radar station was constructed and operated by USDA	Eyesore next to tourist attraction		In use
Lover's Leap - restaurant and bar	A large restaurant with fenced car park constructed	Rubble bulldozed down hill destroying only known location for rare plant		Constructed
Lover's Leap - villas and marina	Plans to construct road to sea, villas, shops and marina		Inappropriate use of site would have led to degradation	Denied
Appleton and the Governor's Coach	Rum tour supported by scenic rail tour with stops in rural communities	Abandonment of railway has led to economic hardship, increased dependence on forests, increased heavy traffic on rural roads		Appleton operating Railway abandoned
Malcolm Bay	Proposal for protected area in preparation Other plans not known	Area has ensemble of environmental values and sustainable economic opportunities	Traditional tourism development would be incompatible with realization of environmentally-sustainable uses	
Black River Boat Tours and Crane Road	Rapid expansion of tourism has been occurring despite absence of plan			
Alligator Pond Hotel	Proposal for hotel, details unknown			Unknown
Treasure Beach	Rapid expansion of tourism has been occurring despite absence of plan		Local residents anxious fear degradation of the environment that has accompanied resort development on the north and west coasts	Vulnerable to over development

TABLE 4 Cont d DEVELOPMENT PROPOSALS AND PROJECTS INFRASTRUCTURE AND HOUSING

PROJECT	DESCRIPTION	ACTUAL IMPACTS	POTENTIAL IMPACTS	CURRENT STATUS
Maggotty Falls (date)	Hydropower plant constructed	Scenic attraction destroyed		Abandoned
YS Falls (date)	Hydropower plant proposed		Potential destruction of attraction	Abandoned
Munro Wind Turbine (Malvern)	Wind turbine constructed and operated at Munro	Munro School's power needs are met excess sold to grid		Successful
Railway	Carried produce and tourists	Abandonment has led to increased heavy road traffic economic hardship		Abandoned
Roads				
Maggotty domestic water supply 1987				
Newmarket domestic water supply				
Rural Electrification		Destruction of trees and views		Ongoing
Operation PRIDE Font Hill	Unknown number of housing solutions Grading in progress	Development outside existing centers in proposed protected area incompatible with the environmental and visual quality of the area	Potential exacerbation of unemployment and impacts on the environment from residents unused to rural life	Ongoing
Operation PRIDE - Luana	1300 housing solutions Grading in progress	Development outside existing centers on land on which the overall visual and environmental quality in part depends	Potential exacerbation of unemployment and impacts on the Morass from residents unused to rural life	Ongoing
Operation PRIDE - west of morass	A housing solutions scheme is proposed in the Vineyard area		Development intensity incompatible with world-class wetland	Location not finally determined
Operation PRIDE - Alligator Pond	479 housing "solutions" under construction	Site is designated as a Conservation Area by Manchester and St Elizabeth Development Orders Part on dunes, part in flood-prone wetland	Will require special care to avoid water quality impacts Location potentially subject to seismic hazard, flood hazard storm surge, sea level rise	Construction beginning

PROJECT	DESCRIPTION	ACTUAL IMPACTS	POTENTIAL IMPACTS	CURRENT STATUS
Rural Township Plan (UDC)				
Replacement of housing at Newmarket after floods	Houses in new township, # unknown			
Malvern Science Resource Centre	Educational facility Strong emphasis on environment	Increased environmental awareness		Successful

2 1 4 Current Threats

In addition to formal proposals and projects, some of which are still under consideration, many examples of ongoing overuse or misuse of resources pose additional and cumulative impacts on the quality and sustainability of the parish. Issues include the effects of livestock farming and its potential decline, deforestation, unsustainable fishing practices, the indirect effects of low standards of living and environmental awareness and the level of local environmental management capacity. These, together with opportunities for improvement or sustainable development, are identified in Chapter 3 in the context of the description of the environment of the parish.

2 1 5 Future Opportunities

The richness of the environment of St. Elizabeth and the justifiable reputation of its citizens for hard work, resilience and creativity all give rise to optimism that the parish can identify and realize opportunities for improved environmental sustainability and economic well-being. Achievement will depend on full participation of local and national interests, both public and private, and consideration of the costs and benefits of development options in as comprehensive a manner as possible. The future of the Santa Cruz Mountains represents one example of such a choice. The mountains are believed to be among the most suitable areas in Jamaica for the

growth of mahogany and other hardwoods (Malvern Science Resource Centre). However, the bauxite industry is considering exploration and mining in the area. The value of the land for mahogany plantations needs to be compared with the one-time value of the area's bauxite (taking account of the anticipated changes in the price of each commodity, the sustainability of each activity and the indirect costs and benefits associated with each choice).

Ramsar Site Declaration In February 1998, the Black River Lower Morass was designated a Wetland of International Importance under the Convention on Wetlands of International Importance (Ramsar Convention). The application is presented in Annex A. The Ramsar Convention provided the framework for international cooperation for the conservation of wetland habitats. The designation of the morass brings with it many opportunities. It will facilitate financial aid for its conservation and, as the morass is a wetland type not found elsewhere in the Caribbean, will gain exposure for Jamaica's conservation efforts.

Rice cultivation in the Upper Morass began to be abandoned in the late 1980s. Since that time, the formerly drained areas have been reverting to wetland at a noticeable rate. The Upper Morass has high value as a bird habitat and intimate ecological linkages with the Lower Morass (see Section 3 6 2 4 in Chapter 3).

2 2 The Concept of Sustainable Development

The United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs " Since that time, as participants in the "Rio +5" conference noted in Denver in 1997, environmental conditions have not improved but rather have grown worse Growing recognition of threats to and significant changes in the global environment have suggested the need to examine the concept of sustainable development, expand and deepen the definition and sharpen measures to determine what is sustainable

When so many live in poverty, the objective must be to improve the quality of life without compromising opportunities for future generations Development alone cannot guarantee improved living standards In some cases, development may meet some measures of sustainability but may actually diminish the quality of life of some and, examined comprehensively, may irreversibly damage critical elements of the natural, man-altered and man-made environment

2 3 The Vision of Sustainable Development for St Elizabeth

St Elizabeth's residents and stakeholders have an opportunity, in their review of and contributions to this Environmental Policy Framework, to develop a local definition of what sustainability means to them and what needs to be done to achieve such a state

Local residents and others have made efforts to develop a vision of sustainable development Box 3 presents summaries of plan objectives and salient statements that provide a starting point for an updated and realistic vision Of these plans, the UDC South West Coast Development Plan has been the most comprehensive While the plan covered a geographic area that included the western coastal areas of St Elizabeth and the Black River Lower Morass, most of its

general recommendations are relevant to the eastern and southern portions of the parish The South Coast Sustainable Tourism Committee, which was established in 1992 and in 1995 became the South Coast Resort Board, has regularly expressed an important part of the parish vision of sustainability based upon small-scale, community-based tourism The Draft Seven-Year Development Plan prepared by a Committee of the St Elizabeth Homecoming Foundation covered the entire parish and did so with a practical perspective examining social, economic and environmental issues However, the plan lacked the benefit of a comprehensive review of social and environmental conditions that would have placed its recommendations in the context of a broad vision for the parish

The following suggested elements of a vision for a sustainable future for St Elizabeth are taken from the documents quoted as well as from stakeholder interviews and community meetings Please add your thoughts on the most important elements and suggest additions or restatements in the space provided

- achieving increased employment opportunities and improved living standards based on a well-balanced array of environmentally-sustainable economic activities, including fisheries, agriculture, carefully-regulated mining and industry and community, heritage and nature tourism,
- halting hillside and flatland deforestation to protect soil resources, the beauty of the landscape and river water quality,
- eliminating or significantly reducing sources of pollution, including dunder, sewage and farm chemicals, to return purity and productivity to river and marine waters,
- restricting mining and quarrying to locations approved by local residents based on comprehensive assessment of the greatest environmental, social and sustained economic benefits of alternative uses,
- promoting more sustainable and creative uses of natural resources to enhance incomes through producing a wider array of items for sale locally and elsewhere,

BOX 3 DEVELOPMENT PLANS AND VISIONS

The Town Planning Department's 1983 Development Plan/Order contributed to a vision of sustainability by designating an extensive conservation area incorporating a stretch of coast and hinterland from Font Hill to Bull Savannah and including the Upper and Lower Black River Morass, the Nassau Mountains and parts of the northern watershed boundary with Cockpit Country

The 1995 Draft Seven-Year Development Plan by the Economic Development Committee of the St Elizabeth Homecoming Committee seeks to protect natural resources in order to sustain economic growth, the beauty of the parish and the livelihood and well being of local people. The program endorses the need for EIAs on bauxite/alumina, cement, rum and pimento processing. The restoration of heritage buildings and upgrading of Holland Bamboo Avenue are also objectives to be met under the current agenda.

The 1990 Southwest Coast Development Plan by the Urban Development Corporation (UDC) made specific recommendations regarding the four-mile wide strip of coast from the town of Black River westwards. Although the plan was not officially adopted, the UDC has acted on some recommendations, making beach and road improvements at Bluefields, for example. The following statement from the UDC Plan provides a good summary of the challenge facing the region:

"to encourage investment which would diversify the economic base of the area, provide employment and training opportunities for the local labour force, capitalize on and enhance local agricultural production, improve infrastructure, transportation and communications linkages, develop the human resources, social and recreational facilities and, at the same time, preserve the existing ambience and protect environmentally sensitive areas through unobtrusive and sympathetic development."

The South Coast Sustainable Development Plan began in late 1997 under the auspices of the Town Planning Department. The plan covers the entire coastal strip from the Hellshire Hills to Negril/Green Island and includes the Black River Lower and Upper Morass. For its recommendations to be valuable and influential, the plan will require the input of all St Elizabeth/Black River stakeholders. The authors note that:

"The South Coast of Jamaica includes some of the least developed regions of the island, and many of the remaining virgin environmental areas. However, in recent years, the pace of ad hoc development has increased, particularly in tourism and has already begun to impact the land prices, employment and the environment in the area. The Government of Jamaica (GOJ) recognizes that **the prospect of rapid and unplanned growth, pressures on limited infrastructure, and environmental degradation require planning and careful selection of development options** to avert the negative economic, social and environmental consequences attendant on rapid and unplanned development. The South Coast presents an opportunity to plan for development on a sustainable basis, with tourism as a potential engine for growth before intensive economic activity has advanced in the area and **to use the lessons learnt from the experience of development on the North Coast of Jamaica in planning the development of the South Coast**." (Emphasis added)

- promoting small-scale tourist accommodations and related activities that offer maximum benefit to existing residents and minimize the infrastructural and in-migration impacts associated with large-scale coastal development,
- rejuvenating the craft industry and other cottage industries,
- recognizing and restoring the historic beauty of Black River and other towns, rather than redeveloping them,
- containing growth within existing settlements and preserving the distinctions between urban and natural or rural areas and especially between town and morass,
- making agencies aware of the NRCA Act and its effect on their portfolios, to provide the infrastructure and skills for them to cooperate with NRCA protected area management),
- circulating the Town Planning Department Manual for Development or producing and circulating a similar document to provide practical environmental guidelines for developers and development agencies,
- designating sensitive zones in which single dwellings will need approval, and
- establishing a pilot proactive planning unit, equipped with GIS, to advise prospective developers at the conception of a project

2.4 The EPF Process for St Elizabeth

2.4.1 The Process to Date

This draft EPF document presents a compilation of information and recommendations upon which the citizens of St Elizabeth and other stakeholders can base future decisions about coordinated environmental management. The box below summarizes the process to date and the following sections describe participation in the process and next steps.

Community Involvement. Community participation in the EPF process spanned the period from October 1996 through June 1997. During that time NRCA's project team consulted with communities and interest groups on environmental concerns, resource-use threats and strategies. Groups included dairy farmers, fishermen, shrimp hugglers, cattlemen, farmers, tour guides, thatch craftswomen and crafts vendors. The objective was to integrate the economic and environmental needs of local people with the broader protection of the area's ecological diversity including plans for establishing Protected Areas.

Most communities are concerned about roads, water, improved schools and civic facilities, employment and markets for their crops and/or products (including shops to display their wares). There is a general belief that government, at the expense of small business people, farmers, craftspeople and poor communities supports large businesses. A frequently expressed view is that the immediate needs of communities and environmental impacts caused by big business should be addressed before smaller environmental offenders are penalized.

This and other views of the environment and responsibilities for its improvement were revealed by a survey of environmental awareness, attitudes and behavior conducted throughout the parish in 1997. A summary is provided in Annex B. Participatory Rural Appraisals later enabled rapid transfer of information collected during the consultations and facilitated design of priority projects.

BOX 4 THE ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK PROCESS TO DATE

This draft document is a result of a consultative process that so far has included the following steps

- *An effort by the NRCA to collect available information on environmental social and economic conditions*
- *A presentation by the NRCA on Protected Areas and input by St Elizabeth residents to the identification of public interest resources*
- *A Survey of Environmental Awareness of the Black River Area (see Annex B for a summary of findings)*
- *The identification by the NRCA and stakeholders of public interest lands*
- *Interviews with stakeholders are conducted to learn about their needs development plans and observations regarding environmental issues current initiatives and possible improvement projects*
- *Distribution of a Community Discussion Booklet including stakeholder input to guide public meetings and facilitate decision making*
- *Community meetings during which the NRCA and stakeholders have worked together towards consensus on Protected Area policy priority actions and appropriate management strategies*
- *An Environmental Exposition and stakeholder forum held in June 1997 in Santa Cruz and*
- *Distribution and review of this draft Environmental Policy Framework document based on decisions made during consultations*

A community information booklet was widely distributed and, in the case of organized meetings, maps of the project area were used to convey and solicit information on the locations/boundaries of areas of interest. The process involved meetings and presentations, combined stakeholder meetings and culminated in an Environmental Exposition at Santa Cruz from June 10 to June 12, 1997.

Institutional Involvement. Institutions consulted included CBOs, environmental NGOs, service clubs, regional/local offices of national institutions, the St Elizabeth Parish Council, and educational institutions. In most cases, informal discussions with officers of the organizations were held prior to formal meetings.

In addition to facilitating meetings with communities and other groups, several organizations collaborated with the NRCA in staging the St Elizabeth Environmental Exposition. This collaboration took the form of a local planning committee for the Expo as well as participation in the exhibition, panel discussions and a combined stakeholder meeting on 12 June 1997.

Consultation with national sectoral and cross-sectoral planning agencies also took place on a limited scale and is continuing.

2 4 2 The Review Process and Next Steps

The Preparation and Content of the Final EPF The aim of the final EPF document is to reflect a collective commitment to the improvement of St Elizabeth's environmental quality and sustainability through its inclusion of

- A statement of environmental policy,
- A framework for NRCA program, projects and activities, including stakeholder input to the NRCA regarding Protected Area establishment,
- A basis for co-operative agreements between public and private sector interests (NRCA, other government agencies, the communities, NGOs, businesses and other groups) on policies to follow and actions to be taken to resolve immediate and longer-term environmental threats,
- An action agenda for dealing with priority environmental problems and issues, including improvement projects to address environmental threats and support environmentally sustainable tourism, resource use and development, and
- A statement of commitment to work together for environmental management and a continuing process allowing all interests to participate in refining and implementing the action agenda

Actions needed to finalize the EPF document and implement its recommendations include

- Completing an inter-agency consultation process with national planning agencies and institutions with an interest in the parish,
- Obtaining consensus at the local level on the draft document,
- Obtaining the support of national/sectoral planning agencies for the efforts outlined in the EPF document,
- Obtaining NRCA approval for using the EPF process as a framework for guiding NRCA's program in St Elizabeth,
- Obtaining the official declaration of the Protected Areas, and

- Formulating co-operative agreements with relevant groups and institutions for implementation of the EPF process, identifying the necessary resources for implementation of the EPF process

2 5 Protected Areas Planning as an Element of the EPF

2 5 1 Relationship of the EPF to Protected Areas

The EPF aims to bring increased coordination, based on a collective vision, to a variety of public and private actions that affect the environment. One of the tools of the EPF is establishment of Protected Areas. At the same time, the EPF provides input to the planning of future protected areas and helps to ensure their effective management.

The EPF covers the entire parish of St Elizabeth but pays particular attention to conditions within the proposed Black River Morass Protected Area and other possible Protected Areas. The wider scope of the EPF ensures that the proposed Protected Area or areas are not established or managed in isolation from the social and ecological context. By addressing the surrounding region

- the most appropriate boundary for the Black River and other Protected Areas can be delineated,
- outlying regions of special significance can be considered,
- sources of pollution outside but affecting the Protected Area(s) can be controlled or eliminated, and
- indirect environmental impacts can be predicted and better managed

2 5 2 Goals, Objectives and Benefits of Protected Areas

A Protected Area is an area of land or water that is managed for the conservation of its ecological systems, biodiversity, and specific natural, cultural and aesthetic resources. Establishment of a Protected Area helps to ensure that these resources can continue to be used for the

benefit of present and future generations. It does not necessarily restrict use of resources within the boundaries but can protect the area from unsuitable uses and practices and encourage alternative and more sustainable activities.

By participating in the planning and management of a Protected Area, stakeholders whose businesses and livelihoods are dependent on the quality of these resources can be assured a more secure future. Benefits accrue at local, national and international levels and include

- Responsible community control and sustained management of natural resources,
- Larger fish and shellfish populations and protection of trees and plants with economic value,
- Control of illegal and destructive activities,
- Increased employment and income from environmentally sustainable tourism and other industries,
- Preservation of scenic landscapes, and
- Enhanced local and national image

2.5.3 Types of Protected Areas

The NRCA, recognizing that different areas have different needs, has defined six types of Protected Area for the Jamaican System of Protected Areas. The distinct characteristics and management purposes are presented in Table 5 so that stakeholders can express views regarding the type or types most appropriate for the Black River Morass and elsewhere.

2.5.4 Prior Proposals and Current Concepts

In 1986 a suggestion was made that the Lower Morass be nominated for declaration as a World Heritage Site. In 1990, a study for the Jamaica Conservation and Development Trust (JCDDT) (Conrad Douglas & Associates, 1990) stated "The ecological importance of the Black River

as well as the economic and social feasibility of protection identify Black River [Lower Morass] as the prime candidate for Jamaica's next national park. This would set the standard for sustainable development of the south coast.

The Black River area was included in the 1992 Draft Plan for a System of Parks and Protected Areas for Jamaica (JCDDT, 1992). In 1995, the PARC II Project proposed declaration of a national park encompassing the Upper and Lower Morass and parts of the adjacent mountains that surround and influence it. However, none of these proposals or recommendations has yet come to fruition.

The delay in implementing the recommended Black River national park/protected area status has meant both lost opportunities and new opportunities. As discussed above in Section 2.1.2, establishment of a national park ten years ago would have been a significantly easier task than it is today because of the limited commercial activity dependent on the resources. The intervening decade, and especially the past three years, have contributed increased experience with park management, both locally and internationally, and wider dialogue regarding feasible options for managing protected areas in Jamaica.

2.5.5 Management Models/Options/Opportunities

Policies for the expansion of a System of National Parks and Protected Areas, prepared by the NRCA and approved by the Government as a White Paper in December 1997, provides guidance for protected area planning in St. Elizabeth. The White Paper presents a new vision of what constitutes a protected area. It recognizes the need for a variety of management options, as set forth in Table 5. The options respond to

- varying levels of need for protection or intervention to improve conditions and varying suitability for productive use, including local community subsistence, education, scientific research, recreation and specialized tourism,

- financial limitations that make a centrally managed system of parks infeasible and partnerships with local management entities essential, and
- the dependence of enhanced and sustained environmental quality in a protected area on coordinated management of the areas that surround and affect it

Most importantly of all, the options recognize the central importance of local participation in protected area planning and management if the system is to operate effectively. The White Paper describes a process whereby a local organization, which may be the parish council, an NGO, a CBO or a private individual or organization can propose declaration of a protected area. (In the absence of any local initiatives, the NRCA may take the lead where the need is urgent.) The policy document also describes the criteria that a prospective management organization must meet and the steps it needs to follow in order to have management authority delegated to it by the NRCA.

2.5.6 Current Protected Area Proposals

The citizens of St Elizabeth now have the opportunity to participate in determining the type or types of local protected areas and management structures that will have the greatest benefit for the biodiversity and the economic well-being of the parish and the nation. Your comments and proposals will be appreciated.

Annex C contains the results of boundary and classification surveys conducted by the NRCA in 1997. After you have read through this EPF document, please record your thoughts on the recommendations in the space below.

TABLE 5 TYPES OF PROTECTED AREAS

TYPE	DESCRIPTION	SELECTION CRITERIA
NATIONAL NATURE RESERVE	Encompasses lands or waters with outstanding or representative ecosystems unique, endangered or threatened plant and animal species and/or geological or physical features. It requires the strictest management of the protected areas and use is limited to scientific research, education and restricted ecotourism.	The area should be large enough to ensure the integrity of its ecosystems. It should be free of human intervention and capable of remaining so and maintenance of the area's biodiversity should not require active management or habitat manipulation.
NATIONAL PARK/MARINE PARK	Established to protect the nation's most prominent natural areas such as the Blue/John Crow Mountains. National Parks are intended to protect major biodiversity and ecosystems for use by present and future generations for education, recreation, scientific research and tourism. Uses of National Parks or Marine Parks must not affect the area's natural resources.	The area should contain a representative sample of major natural regions, features or scenery where species, habitats or ecosystems are of special scientific, education, recreational or tourist significance. It should be large enough to encompass entire ecosystems and ensure that those ecosystems will not be altered by human activity.
NATURAL LANDMARK / MONUMENT	These protected areas can be sites, areas or features of exceptional natural, historical, cultural or aesthetic significance. Uses of these protected areas can include research, education, tourism and recreation.	Natural features that might qualify for this classification could include spectacular waterfalls, caves, coral reefs, cultural features could include historic buildings and archaeological sites of special heritage significance.
HABITAT / SPECIES MANAGEMENT AREA	Actively managed to maintain valuable natural habitat necessary to protect significant species or biological communities. Can include nesting, nursery and feeding areas such as mangrove wetlands, seagrass beds and/or coral reefs, whose conservation depends on active intervention by a management authority. Habitat is managed to ensure the long-term health of species where the species require human intervention for optimum management, to promote the sustainable use of the area's natural resources to ensure long-term benefits for local populations, and for scientific research and environmental monitoring related to sustainable resource management.	The area should play an important role in the survival of species. In these areas, protection and management of habitat helps to maintain or optimize species population.
NATIONAL PROTECTED LANDSCAPE OR SEASCAPE	An area where harmonious interaction between people and nature over time has resulted in the development of significant cultural, aesthetic and ecological values. Management is geared towards the preservation of the area's natural and scenic values for recreation, education and tourism appropriate in type and scale to the essential qualities of the area. Objectives are to maintain or restore the harmonious interaction of nature and culture and to continue traditional land uses, building practices and cultural features.	These protected areas included undeveloped sections along coastal highways with high scenic qualities, rich habitats and evidence of traditional land use patterns. Such an area should provide opportunities for public enjoyment through recreation and tourism that do not disturb its traditional lifestyle and economic activity.
MANAGED RESOURCE PROTECTED AREA	These are lands and waters with important resource and environmental values that exist in a mainly unaltered state. Objectives include protection and maintenance of biological diversity, promotion of sound management practices for sustainable use of resources, protection of the natural resource base from detrimental land use purposes and contribution to national development. Uses can include sustainable forestry, fishing, tourism, recreation, research and education.	These areas should be in a relatively natural state, although some human modification is acceptable. The area should be large enough to support sustainable resource use without detriment to its ecology.

3 DESCRIPTION OF THE STUDY AREA

3.1 Introduction

The following description provides general information for the parish and more specific information where relevant. The text refers to the bio-social regions shown in Figure 2 and summary information is given for each of them in tables at the end of the chapter. The chapter covers the full range of features and processes that make up the natural, man-altered and man-made environment.

3.2 Topography

The topography of the watershed, (see Figure 6) ranges from close to sea level to 500 to 800 meters in the frame of surrounding mountains and plateaux.

3.3 Climate

Most of the parish has annual rainfall between 1 300 - 2 400 mm (50 - 100 in). However, the southern Pedro Plains, in the rain shadow of the Santa Cruz Mountains, get much less than 1 300 mm (50 in). By contrast (see Figure 7), the Cockpit Country receives 2 400 to 4 800 mm (100 to 200 in).

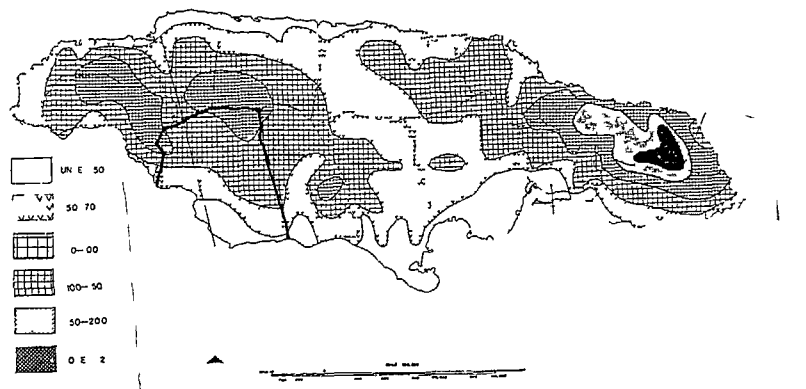


FIGURE 7 ISOHYETS

Typically about 70% of annual rainfall occurs in the summer between the two wettest months - May and October.

Prevailing winds are from the south-east. Coastal hilly areas such as Malvern are particularly windy and have potential for wind power generation.

3.4 Geology and Soils

3.4.1 Major Geological Provinces

The geology of St. Elizabeth (Table 6, and Figure 8) is varied and interesting, featuring very recent deposits along the coast and very old ones in the north.

According to geological time the peat of the Black River Morass system is very young - less than 20,000 years old. At the end of the last ice age (about 18,000 years before present) the sea was below its present level. As the ice melted sea levels rose gradually and swamps formed in a series of bays enclosed by the limestone hills, in which the partially decomposed plant material accumulated as peat. Today peat deposition is still occurring and offers a possible buffer to sea level rise as a result of global warming.

The limestones that dominate the hills that surround the swamps are older, having been formed under the sea about 2-48 million years ago. Among the many reminders of this process are rocks in Accompong that contain fossil sea shells.

The oldest rocks in Jamaica occur in the central inlier and date back more than 65 million years. A small outcrop of old red sandstone near Ginger Hill was formed in this period.

TABLE 6 GEOLOGICAL HISTORY OF ST ELIZABETH

PERIOD	EPOCH	APPROXIMATE AGE	FORMATION	AREA
QUATERNARY	Recent (Pleistocene)	Recent	Coral reefs	Luana Black River Bay Alligator Reef
		Recent	Alluvium and other superficial deposits	Lowlands surrounding morasses Pedro Ponds Font Hill Alligator Pond Nassau Valley
		6 500 years B P to present	Marshland	Font Hill BRLM BRUM Parottee
		2 million years B P	Coastal Group (sand and gravel)	Font Hill (west)
	Lower Miocene to Mid Eocene	24-48 million years B P	White Limestone Group	
		24-48 million years B P	Newport Formation	Santa Cruz Middle Quarters and Lacovia Mountains
		24-48 million years B P	Walderston Brown s Town Formation	Nassau Mountains and hills west of Maggoty
		24-48 million years B P	Gibraltar Bonnygate Formation	Newmarket plateau
		24-48 million years B P	Troy/Claremont Somerset Swanswick Formations	Hills around Ipswich and east of it
	Mid Eocene	48 million years B P	Yellow Limestone Group	Hills around Accompong
CRETACEOUS	Maastrichtian	65 million years B P	Undifferentiated red sandstone	Ginger Hill

3 4 2 Important and Interesting Geological Features

Caves Limestone is typically rich in caves and St Elizabeth is well endowed Ipswich Caves (Ipswich) and Wondrous Cave at Elderslie are among the best-known but altogether 99 caves have been documented (Annex E) Some contain deposits of bat guano, traditionally mined for use as a fertilizer

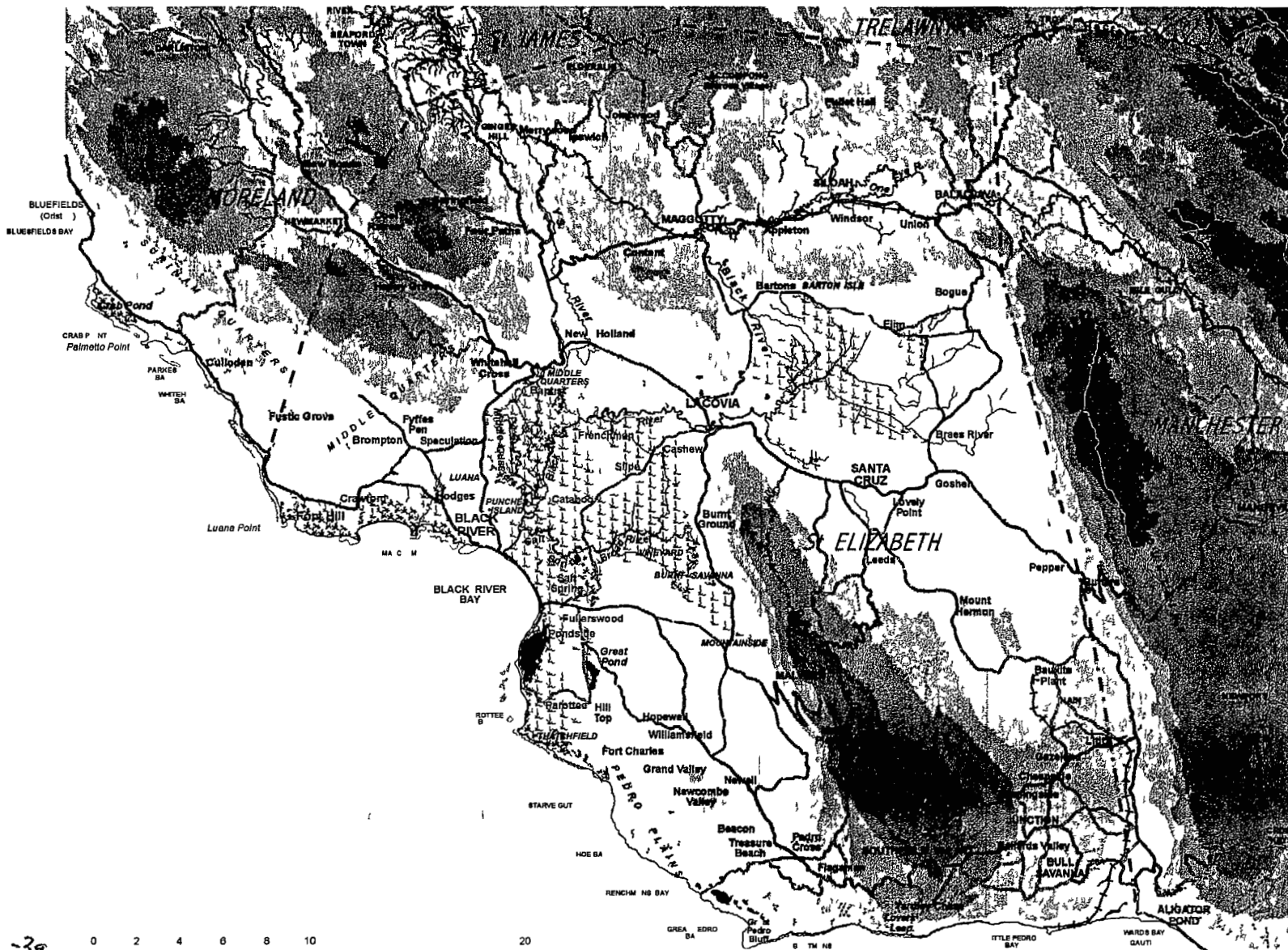
Sand Dunes Although sand dunes occur along many coasts worldwide, they are uncommon in Jamaica There are good examples in Alligator Pond, Frenchman's Bay and Hodges

Waterfalls YS Falls, Jamaica's second most important commercial waterfall, narrowly escaped being modified to support a hydropower plant in the 1980s Maggoty Falls, a famous beauty spot, was ruined when a hydropower plant was installed The plant is now abandoned

Fossil Beds St Elizabeth is rich in limestone fossils There are also interesting fossil corals and aeolian fossil roots around Great Pedro Bay

Mineral Springs The Black River Spring is located on the coast immediately west of the hospital It rises in limestone, about 0 6 m (2 ft) above sea level and flows at about 1,200 US gal/min It is mildly radioactive and rich in hydrogen sulphide

Rises and Sinks Drainage in karstic limestone is a complex combination of surface and underground water and streams Rainwater dissolves cracks in limestone and eventually collects in sufficient volume to rise back to the surface, flooding the bottom of cockpits Because rainwater sinks so quickly into the ground, not many rivers cross the Cockpit Country Those rivers that rise in blue holes may flow a short distance and disappear in sinks



ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

**Figure 6
Topography**

LEGEND

- Morass / Wetland
- Mangrove
- Parish Boundary
- Road Class A
- Road Class B
- Road Class C
- Railway
- Seasonal Gullies & Drainage Features
- Small Rivers & Streams
- Large Rivers
- Ponds
- Elevation
- 0 20
- 20 80
- 80 200
- 200 400
- 400 600
- 600 800
- 800 + metres

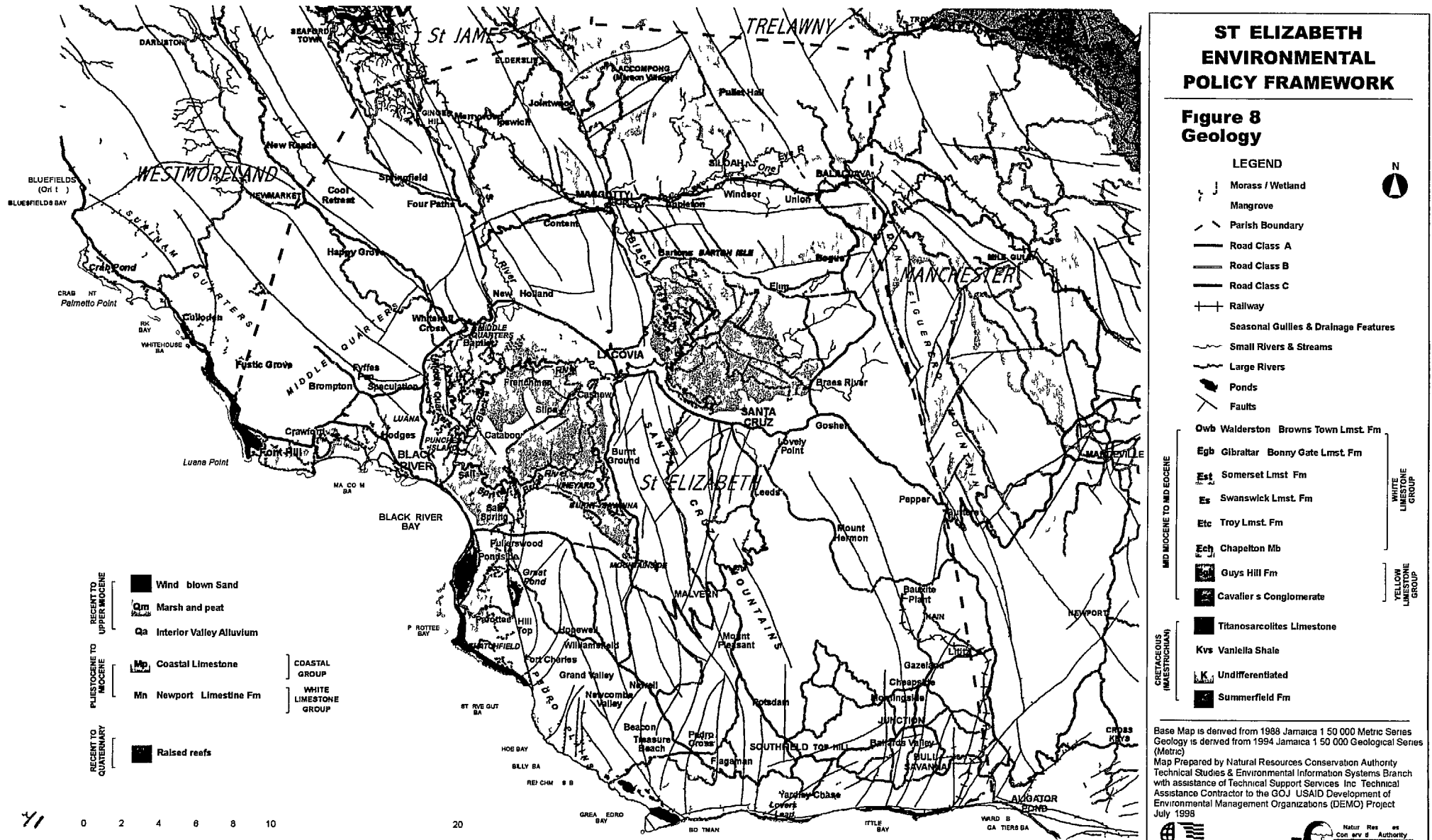


Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services, Inc. Technical Assistance Contractor to the GOJ. USAID Development of Environmental Management Organizations (DEMO) Project July 1998



Ministry of the Environment
Conservation Authority

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3 4 3 Commercially Important Minerals

Limestone and Whiting St Elizabeth is dominated by limestone and contains ten designated quarry zones and several small illegal quarries (see Figure 9). Large-scale exploitation of limestone for export has been proposed, with suggested ports being Scotts Cove and Black River. Negative impacts of limestone mining include damage to aquifers, visual impacts such as scarring of hillsides, dust and noise nuisance from blasting, mining and trucking operations and increase of heavy traffic on narrow winding rural roads.

Issue 13 (National) It seems that the GOJ, in its efforts to increase exports, has failed sufficiently to consider the direct and indirect costs of limestone mining

Issue 14 (Local) Planning on a regional level is essential if fundamental conflicts in development strategy (like promoting the same location for heavy industry such as large-scale export of limestone and tourism) are to be resolved.

Peat Peat reserves in the Black River Lower Morass have been estimated as nearly 25 million metric tons, equivalent to a total generating capacity of 143 MW for 30 years. Although this sounds attractive, several studies have determined that the long-term costs (economic, social and environmental) would be much greater than the short-term economic benefits.

Clays The limestone outcrops, principally at Slipe and Vineyard, have associated residual and sedimentary clays, often directly above the limestone. The clay reserves at Holland, Frenchmans and the Black River Valley are suitable for bricks and pottery (Table 7).

Silica Sand Silica Sand is used in glass, foundry sand, tableware, bricks, abrasives, paints, glazes and glues. The only large deposits in Jamaica are found at Brompton, Speculation, Luana, Punches and Frenchmans but are only mined at Hodges. West Indies Glass Co. at Hodges holds a special mining lease covering 1.8 sq. mi. In 1983 reserves included 130,000 tons at Big Tankey, 251,000 tons at Negro House, 325,000 tons at Sandy Ground and less than 671,000 tons at Cow Market-Crawford's Pen.

Guano Many caves in Jamaica contain guano, formed mostly from bat droppings whose phosphate content has been fixed by chemical reactions with the limestone. These deposits have traditionally been mined for fertilizer. Since 1950 the Geological Survey has located 53 potentially suitable caves in St Elizabeth and surveyed 15 of them, finding phosphates in five. There are no recent data about reserves and most accessible deposits have probably already been exhausted. Should any reserves remain, selection of caves for mining and the granting of permits should take into consideration whether the guano contains important fossils, whether the cave contains important bat colonies that might be disturbed by mining, and whether the caves (if large) have been surveyed by biologists. Cave systems often contain rare and unusual species of animals.

TABLE 7 DISTRIBUTION AND USES OF CLAYS IN ST ELIZABETH

LOCATION	POSSIBLE USES	ESTIMATED TOTAL RESERVES
Raheen to YS along One Eye River	Bricks, tiles, sanitary ware, coarse pottery	500,000 long tons
Holland Estate, either side of main road	Reddish brown - for drain pipes, flower pots and bricks. Off-white - earthenware	250,000 tons
Frenchmans	Insulation, table ware and ceramics	30,000 tons
Cow Market (Hodges)	Tableware and acid resistant floor tiles	300,000 tons

Figure 9. Limestone and Whiting

Other Mineral Resources The coastal sands of the area are rich in minerals. The long-shore current tends to transport titanium and iron-rich sand along the coast. The effects can be seen after rough weather, when bands of black sand form (so high in iron that a magnet is attracted) form on beaches. The black sand mixes with the white sand to produce the characteristic greyish sands of Treasure Beach. Sub-sea deposits of antimony and titanium occur in Great Pedro Bay and Alligator Pond but not apparently in commercially viable quantities.

3.4.4 Soils

Soil Types Along the coast between Black River and Parottee the soils are formed on recent alluvium and are mainly very poorly drained, highly saline, unripened stratified soils of various colors and natures. The river bank soils are mostly formed on old alluvium and are moderately well drained, deep, yellowish brown and reddish brown cracking clay soils and secondary lime in places. The soils of the Black River Lower Morass are clay or clayey marls, 1-10 m deep, overlying sedge peat, on top of clayey peat on the limestone bedrock.

Soil Capabilities The parish has only a few small areas with Class I. The relatively limited areas of Class II soils occur predominantly in the river valleys and around the morasses (Figure 10). Agriculture on the Pedro Plains depends on the careful use of erodible Class III soils. The wetlands are not generally suitable for intensive large-scale agriculture although parts are suitable for rice, or seasonal pasture. Limestone outcrops are best suited for woodland. The Rural Physical Planning Unit (RPPU) places a substantial portion of the parish, estimated at ___ percent, in Class VI, so marginal that the existing vegetation should never be disturbed.

Issue 15: Comparison of the area in Soil Capability Class VI on Figure 10 with the Land Use map (Figure 14) indicates that a considerable portion of this land has been disturbed.

3.5 Hydrology

3.5.1 Basins/Sub-watersheds

With a total area of 157,500 ha (378,000 ac) the Black River watershed (Figure 11) is the second largest in Jamaica. (The 171,000 ha Rio Minho watershed is the largest.)

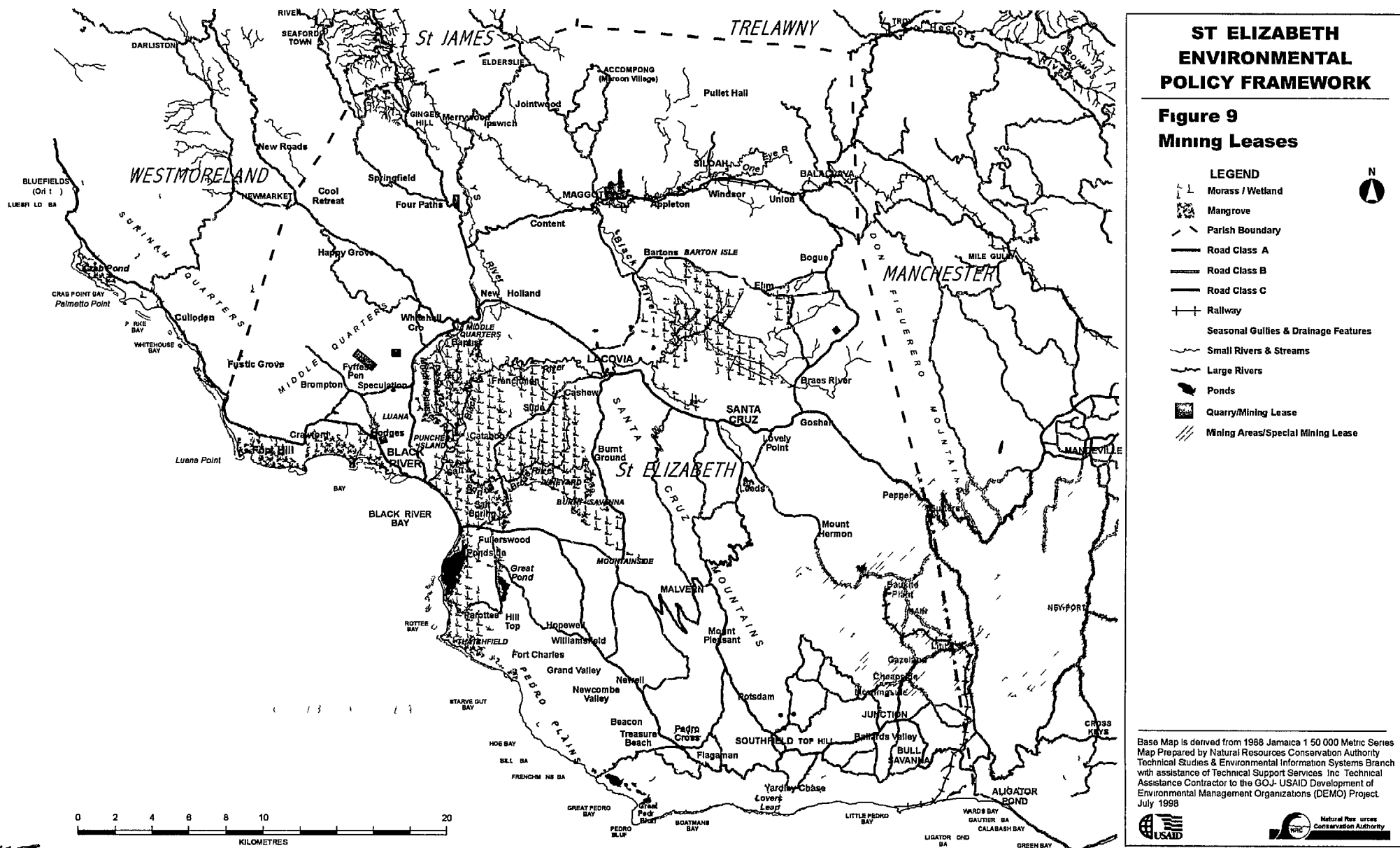
3.5.2 Streams, Rivers and Springs

Although St. Elizabeth has relatively few rivers in comparison to some other parts of Jamaica, it includes the longest river (Black River), the largest freshwater lake (Wallywash) in the country and numerous other unusual hydrological features.

Black River System Seventy kilometers long, the Black River rises in the foothills of the Cockpit Country and follows a circuitous course, through two major basins, before it enters the sea at the town of Black River. The Black River system, including the Broad, YS, Middle Quarters, Punches and Salt Spring Rivers, relies on recharge from the limestone aquifers in the mountains and surface water flows from the hills.

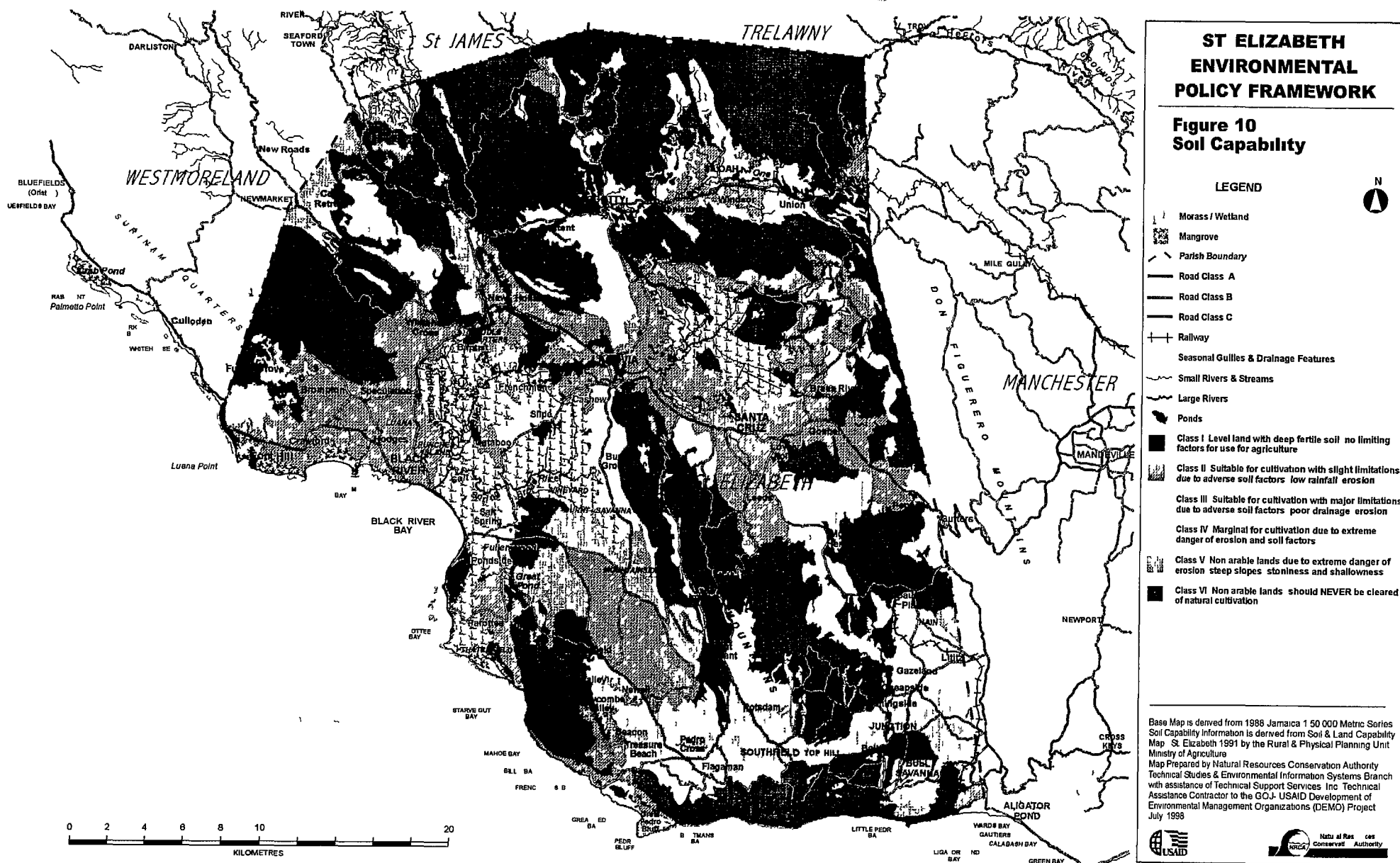
Ponds Fed by springs, Wallywash Pond is a major source of water for the surrounding communities. It is also very scenic and is important to wildlife. Other inland freshwater ponds may be seasonal. Ponds in upland pastures are mainly dew ponds created to supply water for cattle. Freshwater ponds are important for ducks as well as various species of invertebrates. Silica sand mining created small ponds on the Hodges property and beach sand mining has created ponds on some beaches. Great Pedro, Parottee and the mangrove ponds of southern Font Hill are hyper-saline.

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Springs There are many seasonal springs throughout the area including freshwater upwellings on the coastal shelf. The only known mineral spring is the Black River Spa, once a popular resort. It has high sulphur content and is reputed to be good for skin disorders. The importance of small local springs, which provide drinking water and water for irrigation for rural communities has not been fully assessed.

Water Balance of the Black River Morass The life of the morass depends on its water balance, which can easily be disrupted by careless use, as shown in Table 8

TABLE 8 WATER BALANCE IN THE BLACK RIVER MORASS

WATER IN	WATER OUT
SURFACE RUN-OFF Surface water enters through rivers, streams and seasonal gullies which have catchments outside the wetlands (e.g. YS River, Black River). These rivers flow faster and higher after rain, and carry large quantities of nutrients and silt in the system. Issues Increased deforestation and mining will increase the frequency of flash floods and reduce the quality of the water.	Most water leaves through the main channel of the Black River where it enters the sea forming a large muddy plume which stretches several kilometres out to sea. Issue contaminated water from the morass could spread pollution along the coast.
GROUNDWATER DISCHARGE Rivers (like Frenchmans, Middle Quarters and Broad Rivers) are fed by numerous blue holes and sub-surface springs in the morasses. Issues The groundwater originates in the Cockpit Country. Deforestation and mining will reduce the amount of groundwater entering the system. Groundwater can be contaminated by domestic and agricultural wastes.	GROUNDWATER RECHARGE Water leaks out into aquifers through the limestone, and into the sea through the coastal sand bar. It also forms freshwater upwellings under the sea. If the aquifers are contaminated these upwellings can contribute to marine pollution.
RAINFALL Issue Deforestation in the morass and environs, including a large part of Cockpit Country, could reduce rainfall and hence the amount of water entering the system.	EVAPOTRANSPIRATION Water evaporates from the surface of the swamp and is transpired by plant leaves. This increases humidity and probably increases rainfall in the vicinity. Issue reduction of vegetation e.g. by burning or cutting could reduce transpiration.
SEAWATER Seawater seeps in under the morass and up the rivers and can be found more than 7 miles inland. It is held back by the freshwater in the morass. Issue If too much water is taken out of the system more salt water will penetrate further inland and wells will become unusable.	EXTRACTION OF WATER FOR DOMESTIC AND AGRICULTURAL USE Water is taken from the system by NWC (pumping stations at Luana,) and through private wells and pumps. Issue are EIAs required? Suggested withdrawal of small volume (5%) could have significant consequences.

Importance of Water to Black River and Environs The economy of the Black River area depends directly and indirectly on the water of the morass and the rivers that feed it, yet most residents take this resource for granted. Some of the issues that surround the uses of water in the morass are described in Table 9. Meanwhile in the surrounding areas (especially the Pedro Plains and Font Hill) the availability of water has long been a limiting factor. Great care will be needed in the future to ensure that economic growth proceeds within the constraints of the availability of water.

3.5.3 Aquifers

There are three freshwater sources in the area: the White Limestone aquifer south of a line between Barbary Hall and Malvern Well, the Burnt Savannah swamp to the north of Mountainside, and the Wallywash Great Pond south of Fullerswood, Nassau Valley. The Pedro coast aquifer is suffering from saline water intrusion 3-5 km inland. The Black River aquifer is saline. The Essex Valley aquifer is contaminated by caustic discharge from Nam.

TABLE 9 BLACK RIVER SYSTEM WATER - USES AND THREATS

TYPE OF USE	DESCRIPTION OF USE	ENVIRONMENTAL ISSUES
DOMESTIC	Local communities depend on water from small springs and dew ponds for water for drinking and irrigation. They bathe and wash clothes and vehicles in the rivers.	The value of this water has never been assessed and is certainly undervalued. Washing in the river introduces phosphates, detergents and oils.
COMMERCIAL WATER SUPPLY	Water for domestic use and irrigation is extracted from the morass along the Black River at the NWC pumping stations at Luana and Wallywash, Salt Spring and at private pumping stations e.g. Holland.	Over-extraction of water could increase saline intrusion (see below). When irrigation water returns to the river it carries agrochemicals and silt. Channelization of the upper morass and destruction of vegetation along the banks of the rivers means that fewer pollutants are filtered out before they enter the river.
AQUACULTURE	Large fish and shrimp farm at Bartons Isle takes water from Black River and returns it to the river after use.	Careless use of agrochemicals upstream could affect farm. Downstream there is a risk of contamination of river with fish wastes and agrochemicals (including antibiotics?).
HYDROPOWER	Hydropower station at Maggoty formerly supplied the grid.	Construction destroyed beauty spot. Any future scheme could have similar effects and disrupt hydrologic regime and movement of fish.
TRANSPORTATION	River was previously used as natural highway linking communities to Black River and carrying goods (logwood, hardwoods, agricultural produce) to point of sale.	Clogging by water hyacinth (fed by high nutrient levels) now restricts movement, forcing greater reliance on roads with accompanying impacts.
TOURISM	Boat tours operated from Black River attract about 200 tourists per day. Rafting from Middle Quarters expected to attract about 20 per day.	Many concerns have been expressed about impacts of boat tours on river. The carrying capacity study does not adequately address the problems.
WASTE DISPOSAL AND DILUTION	Dunder, oil and chemicals (including battery acid) are dumped into the river which dilutes them and transports them from the site.	River pollution leading to eutrophication, death of fish and shrimp, growth of water hyacinth, loss of amenity values.
FISHABLE RESOURCES	Streams are important nursery grounds for shrimp and fish. Fish are caught by nets (illegally), hook and line and spear gun. Shrimp and crab in pots.	Overfishing Pollution Changes in river ecology and water balance could reduce fish and shrimp production.
CHEMOTHERAPY	Reputedly healing properties of water at Black River Spring.	Poor waste disposal at hospital, marts, spa.
BIODIVERSITY	Habitat for many species including rare and endangered plants and animals. Small ponds are of special importance.	Aquatic ecology (especially plants, shrimp) poorly understood. Small ponds particularly vulnerable to destruction.

3 6 Ecology

3 6 1 Ecosystems

This section is designed to set out as clearly as possible the wide range of ecosystems within the parish, examining forests, wetlands and coastal/marine ecosystems, as identified in Figure 12. The following section, 3 5 2, addresses species in a similar sequence.

3 6 1 1 Forests

a Moist forests on limestone (Wet limestone forest) The north of the parish includes the southern Cockpit Country and its foothills. The karst limestone formations of these areas have contributed to development of the highest levels of biodiversity in the Cockpit Country and associated areas (see section 3 5 2 for a discussion of endemic species of the Cockpit Country).

The forest of the undisturbed cockpit bottoms (where there is deep, fertile soil) is tall. The canopy is 30-35 m high with occasional emergents reaching 45m. The forest is dominated by hardwoods such as West Indian Cedar and Broadleaf. Other common timber species include Breadnut (*Brosimum alicastrum*), Black Lancewood (*Oxandra lanceolata*) and Timber Sweetwood (*Nectandra sanguinea*). Silk Cotton (*Ceiba pentandra*) is an occasional emergent. Figs (*Ficus spp*) are common in some areas.

The plants of the sides of the rocky hills, which tend to be short, shrubby and adapted to growing on poor, rocky soils, include many Cockpit Country endemics. The forests of the fringes of the Cockpit Country and the surroundings of Accompong are fragmented as a result of clearance of land for agriculture, timber and stick extraction. However, much intact forest survives in the more remote areas. Extensive areas are included in forest reserves, but it is the inaccessibility of the terrain that has effectively protected the forests. Jamaica has the unfortunate distinction of having the world's highest rate of deforestation and it is thought that less than 5% of Jamaica's

original forests survive relatively intact. **Therefore all remaining old-growth forests are prime candidates for immediate, effective protection.** Nevertheless, prospecting licences have been issued for limestone and bauxite in the Cockpit Country.

Issue 16 Mining and conservation cannot be compatible in the Cockpit Country forests. There are no mitigation measures that could maintain or restore the ecological integrity or watershed functions during or after mining.

b Dry forests on limestone The rainfall gradients that decrease from north to south and west to east have influenced the vegetation. There have been no botanical descriptions of the Santa Cruz Mountains or Nassau Mountains but they appear to be intermediate between the moist Cockpit Country forests and the dry and very dry southern forests. The climate in the hills above Baptist, east of the Black River Lower Morass is very similar to that of southern Clarendon. Only six months of the year are classified as "wet" (with more than 100mm of inches of rain on average). December to April is the driest time. As a result the forests east of the Lower Morass are also similar to those of southern Clarendon with many drought deciduous trees and shrubs, cacti, vines and palms. Common species include Burnwood (*Metopium brownii*), Thrinax, Yokewood (*Catalpa longissima*), various species of Cassia and Acacia, Logwood and Pinguin (*Bromelia pinguin*). Most timber trees have been extracted but there are occasional very large trees such as silk cotton and Breadnut (*Brosimum alicastrum*).

The dry forests are generally more accessible and therefore more disturbed than those of the interior of the Cockpit Country. Nevertheless some important pockets of endemism survive, for example at Redgate near YS Falls.

Issue 17 Mining of bauxite and limestone is a potential threat in many of these dry forest areas.

c Very dry forests on limestone Between Alligator Pond and Starvegut Bay, the coastal hills and cliffs are covered with dense scrubby forest. This area is very dry and the forests are probably similar to those of Hellshire. Ecological studies are urgently needed.

The forests of Pedro Bluff and the hills behind are particularly attractive, because of the abundance of tall cacti and wind-stunted trees. Common species include Braziletto and Maiden Plum.

d Splash-zone forest Around the YS Falls the spray has created a wet microclimate and the old-growth trees and their epiphytes are characteristic of much wetter climates. This is an interesting feature that deserves conservation.

Table 10 summarizes the goods, services and attributes of the dry and moist forests and their contribution to the economy of St. Elizabeth.

3.6.1.2 Wetlands, Rivers and Streams

The wetland and river ecosystems of Black River and environs are the largest in Jamaica. Several studies have shown that the wetlands are of considerable economic importance to the people of the area. The goods, services and attributes of the wetlands and their contribution to the economy of St. Elizabeth are summarized in Table 11.

a Mangroves Mangroves are found along the coast at Alligator Pond and between Starvegut Bay and Scotts Cove. Mangroves usually occur in or beside salt water. Red Mangrove (*Rhizophora mangle*) is the most common species where water is abundant and salinities are moderate. It reaches its largest size and is most spectacular along the middle reaches of the Broad River, where the mangrove corridor is a highlight of river tours. Red mangroves also surround ponds in the lower portion of the morass, at Parottee and Font Hill, and are found along the coast in exposed areas. There are very large stands behind the beach at Malcolm Bay and on the coastal fringes of Thatchfield.

White Mangroves (*Laguncularia racemosa*), some of which are of considerable size, tend to be scattered among the Red Mangroves, often where salinity is moderate to low. Black Mangroves (*Avicennia nitida*), with their dense carpets of aerial roots, tend to be the most common species where salinity is high and the soil muddy. There are large areas of Black Mangroves at Luana and around Parottee Ponds. Button Mangroves (*Conocarpus erectus*) are occasional in drier sandy areas and on rocks.

Issue 18 Mangrove destruction *All along the coasts and in the swamps mangroves are being cut for timber and cleared to open land for construction. Even the mangroves along mangrove avenue on Broad River are taken. Natural regeneration is often slow, taking more than 25 years. When mangroves are removed beaches and riverbanks are unprotected from storms and hurricanes and reefs are more vulnerable to freshwater runoff and silt.*

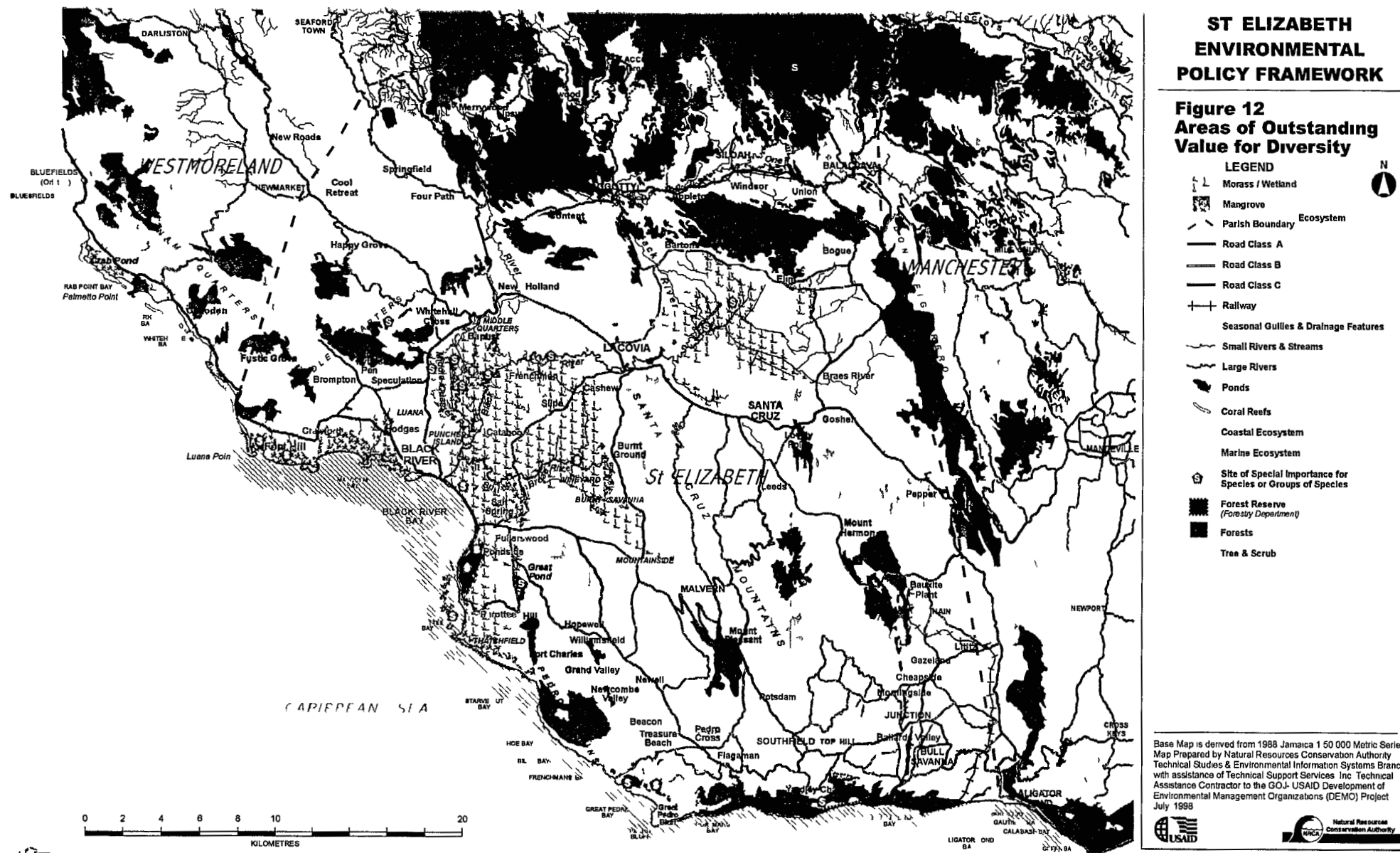
Issue 19 - Dumping household wastes in mangroves *Perhaps because the Black River dump is in mangroves, the people of the parish appear unofficially to have designated all mangroves as dump sites. Throughout the parish, wherever an apparently attractive trail leads off into mangroves, there is always a mound of solid wastes.*

b Herbaceous Wetland or Sedge-Palm Savanna The Black River Morasses are dominated by herbaceous wetlands. Six types have been described from the lower morass (Table 12). The wetlands of the upper morass have never been studied.

Two endemic species of palms, the Royal Palm (*Roystonea princeps*) and Bullthatch (*Sabal jamaicensis*) are scattered in the herbaceous wetlands. Bullthatch is a natural component, tending to occur on small limestone outcrops. The Royal Palms are probably relicts of former patches of swamp forest which have been destroyed by fire or cutting. Many parts of the herbaceous wetlands support dense mats of blue-green algae in the shallow water around the roots of the sedges. These plants contribute to the area's productivity but have never been studied.

ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

**Figure 12
Areas of Outstanding
Value for Diversity**



Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services Inc. Technical Assistance Contractor to the GOJ-USAID Development of Environmental Management Organizations (DEMO) Project July 1998



TABLE 10 GOODS, SERVICES AND ATTRIBUTES ACTUALLY OF POTENTIALLY PROVIDED BY THE DRY AND MOIST FORESTS OF ST ELIZABETH

FUNCTION	SOURCE	PRODUCT
GOODS	1 Water supply	Numerous springs
	2 Mineral resources	Bauxite Limestone and whiting Sand
	2 Forest resources fuel	Wood fuel for cooking Charcoal - for cooking locally and supplied to urban centers
	3 Forest resources - timber sticks and bark	Roundwood for chicken houses and house frames Scantlings for house walls and nog Fence posts (specially logwood and cashaw), Scaffold poles Poles for yam sticks and fish pot construction, Living fence posts Wood for craft industry (especially lignum vitae)
	6 Agricultural resources (food fibre)	Food forests, Wild yams Feral pigs
	7 Forage resources	Forage and grazing for goats and cattle (specially during drought)
	8 Wildlife resources	Subsistence hunting Columbids, Parrots Coney's ? Sport hunting Columbids Pet trade Recreation / tourism Endemic birds (bird watching) Waterfalls Forest trails
	10 Miscellaneous resources	Herbal medicines Plants for horticulture
	1 Water supply	Groundwater recharge - major watershed areas include Cockpit Country, Don Figuerero, Lacovia, Nassau, Santa Cruz Mountains Middle Quarters Hills Forest Pen Hills
	2 Coastal protection and water quality maintenance	Upland Flood and flow alteration (storage and desynchronisation) Coastal shoreline stabilization/shoreline protection Both erosion control/ sediment stabilization
SERVICES	3 Habitat	Wildlife habitat (including endemic species) Endangered species habitat
	1 Biological diversity	Particularly high in Cockpit Country relatively high in Black River
	2 Visual quality/aesthetics/landscape value	All ridges and hills offer excellent views and vistas Special landscapes Cockpit Country, savannas Scenic roads e.g. Malvern Pedro Plains Black River
ATTRIBUTES	3 Education/scientific value	Cockpit Country very high Other areas moderate to high
	4 Recreational value	Potential for many outdoor activities (walking riding, bicycling camping caving)
	5 Uniqueness/heritage value	Cockpit Country - Maroon heritage Historic houses, vernacular architecture

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TABLE 11 GOODS, SERVICES AND ATTRIBUTES ACTUALLY OR POTENTIALLY DERIVED FROM ST ELIZABETH WETLANDS

	SOURCE	PRODUCT
GOODS	1 Mineral resources	E g salt Not currently used
	2 Energy resources (biomass)	Not currently used
	3 Water supply	Wallywash Luana Appleton
	4 Forest resources - fuel	Wood fuel for cooking Charcoal - for cooking
	5 Forest resources timber sticks and bark	Roundwood for chicken houses and house frames Scantlings for house walls and nog Fence posts Scaffold poles Fish pot construction Bark for leather dyes and floor polish (not currently used)
	6 Agricultural resources (food fibre aquaculture)	Fish ponds in Upper and Lower Morass
	7 Forage resources	Grazing for goats and cattle
	8 Fishery resources	Finfish Crustacea (shrimp crayfish crabs lobsters) Molluscs (oysters) Turtles Manatees
	9 Wildlife resources	Subsistence hunting Columbids Waterbirds Turtles Sport hunting Columbids Recreation / tourism American Crocodiles Turtles (potential)
	10 Miscellaneous resources	Dyes not currently used, Craft materials thatch
SERVICES	1 Water supply	Groundwater recharge Groundwater discharge
	2 Coastal protection and water quality maintenance	Flood and flow alteration (storage and desynchronisation) Sediment/shoreline stabilization/erosion control/shoreline protection Sediment/Toxicant retention Nutrient removal/retention/transformation Production export (nutrients) and support to neighboring ecosystems (e g coral reefs)
	3 Habitat	Fish and shellfish habitat (including nurseries) Wildlife habitat (including shorebirds and other migrants) Endangered species habitat (West Indian Whistling Duck American Crocodile West Indian Manatee rare plants)
ATTRIBUTES	1 Biological diversity	Black River Lower and Upper Morasses, Luana Font Hill Parottee Pedro Ponds specially small ponds, reed beds and swamp forests
	2 Visual quality/aesthetics/landscape value	Specially Broad River
	3 Education/scientific value	Not currently used
	4 Recreational value	Lower Black River beaches cays
	5 Uniqueness/hentage value	Swamp forests

Issue 20 - Fire is a natural part of the ecology of the swamps However many fires are set, whether to facilitate fishing and access to streams, to encourage growth of young shoots as pasture, or for fun When fires move through quickly the swamp regenerates quickly, but artificial fires can burn slower and hotter and damage the vegetation in particular the combination of fire and grazing prevents regeneration and re-establishment of mangroves and swamp forests

TABLE 12 HERBACEOUS PLANT ASSOCIATIONS IN THE BLACK RIVER LOWER MORASS
(adapted from Garrick, 1986)

ZONE ASSOCIATIONS

Eastern zone	<i>Typha</i> hummocky swamp
Upper Broad R. basin	<i>Cladium-Sagittaria</i> assoc
North-western zone	
Bounded by Middle Quarters	<i>Cladium</i> hummocky swamp
Holland and Luana	Thick <i>Cladium</i> assoc
Upper YS and Frenchmans R	<i>Typha</i> zone
North-central zone	<i>Typha-Thalia</i> assoc
	<i>Crinum-Sagittaria</i> zone
Southern zone	
Southern mangrove complex	
By Broad R	<i>Scirpus</i> quaking bog
Fringing non-riparian	<i>Cladium</i> /
mangrove forest (Broad R	<i>Conocarpus</i> assoc
to Parottee Pond)	

Dominant plant species

Cladium jamaicense (Saw grass)

Sagittaria lancifolia (pond coco)

Scirpus olnei

Typha dominicensis (Reed mace or cat-tail)

c Swamp Forest The remnant swamp forests are one of the outstanding features of the Black River Lower Morass

The original swamp forests of Black River were similar to those of the Amazonian swamp forests and are reputedly unique in the Caribbean (Proctor, 1986) The upper storey was dominated by species that are usually found in the mountains, such as Boarwood *Symphonia globulifera*, Broadleaf *Terminalia latifolia*, Blue Mahoe *Hibiscus elatus* and Royal Palm *Roystonea princeps* The understorey was dense and varied The endemic and characteristic Anchovy Pear (*Grias cauliflora*), (the only West Indian representative of the Brazil nut family), was common Other common trees included Wild Calabash *Enalagma latifolia*, Fig *Ficus maxima*, *Homalium racemosum*, *Tabebuia riparia*, and *Calyptronoma occidentalis* (long thatch), a common palm There were many climbers and vines, such as *Combretum robinsoni* (an endemic species), Dutchman's Pipe *Aristolochia trilobata*, *Syngonium autitum* and *Philodendrolacernum*

The shrub layer comprised large examples of species such as *Pavonia*, *Eugenia*, *Pyschotria* and *Randia* The ground layer was made up of ferns and herbs such as *Dieffenbachia seguine* and *Crinum americanum* These species are still characteristic of the Black River swamp forests, but the balance of species has been altered by selective extraction of the larger trees The swamp forest at Frenchman is presently dominated by Anchovy Pear, while in other parts there are what may be disproportionate numbers of Royal Palms Most remaining swamp forests have been badly affected by selective extraction of timber, fire and hurricanes

Issue 21 - Hurricane and fire damage The patch of swamp forest at Holland pumping station was badly damaged in Hurricane Gilbert while the long strip of swamp forest between the Middle Quarters and YS Rivers is regularly affected by fire Smaller patches can be seen along the road from Middle Quarters to Black River

Issue 22 - Extraction of hardwoods In the 1990s the rate of extraction of hardwoods from the swamp forests accelerated because sawmill operators were trying to get all the lumber out before they were forced to close because of the new licencing system or prevented from logging under the proposed protected area regulations. As a result of illegal extraction of lumber an important genetic reservoir of diversity for Jamaica's Blue Mahoe may have been lost

d Riverine Forests Once most of Jamaica's rivers were probably lined by distinctive riverine forests. Today there are few remnants and most are badly degraded by selective extraction of timber and the presence of introduced species of trees such as logwood. In St Elizabeth riverine forests are still found along the upper reaches of the Black River near Lacovia and beside the YS River. Even though these forests are highly disturbed they are still very attractive and ecologically important because they help to stabilize the river banks. Dominant species include logwood (*Haematoxylon campechianum*) and guango (*Samanea saman*). Other trees (including an undescribed species of *Lonchocarpus*, *Crudia spicata* sweetwood *Nectandra antillana*, *Eugenia fadyenii*, *Andira inermis* and Pond Apple *Annona glabra*), have become rare. Vines such as *Combretum robinsonii* and *Tanaecium jaroa* are still found on the banks of the river as are a few herbaceous plants such as *Crinum americanum* (a large and attractive lily) and semiaquatic grasses such as *Hymenachne amplexicaulis* and *Panicum elephantipes* line the river in many places.

Issue 22 Extraction of hardwood lumber threatens riverine forests

e Limestone Islands The areas around the settlements of Slape, Cataboo and Frenchmans support a few remnants of their characteristic dry limestone forest which was described in detail in the 1960s and 1970s. At that time trees such as Red Birch *Bursera simaruba*, Dogwood *Piscidia piscipula* and shrubs such as the

indigenous frangipani *Plumaria obtusa* were common in shallower soils. Naseberry bullet (*Manilkara sideroxylon*), *Chrysophyllum oliviforme*, Mastic *Mastichodendron foetidissimum*, *Calyptanthus chytaculia* were characteristic of deeper soils and *Bucida buceras* was found in brackish areas. Epiphytes such as *Tillandsia fasciata* and *T. usneoides* were common.

The bullthatch (*Sabal jamaicensis*) was abundant where soils are deeper. It is of great economic importance in the area because the leaves are used for thatching as well as to make baskets. The number of trees may be declining, because the availability of thatch is a limiting factor for the craft industry.

There have been no recent ecological surveys of the islands but along the roads it appears that many of the natural trees have been replaced by logwood thickets, mangoes, coconuts and ackees. In other parts the original woodland has been cleared for pasture, which tends to be scrubby. A few ponds remain in the pastures and these are of considerable importance (see below).

Issue 23 Extraction of hardwood lumber, fires and illegal agriculture are changing limestone island ecology

f Rivers and Streams Almost all the permanent water courses of St Elizabeth are associated with the morass except the Alligator Pond River and the small rivers of the Cockpit Country (such as the Mulgrave River).

The aquatic ecology of the rivers of St Elizabeth has never been studied in detail. Aquatic plants provide the best indication of conditions in the rivers and it would be very useful to have detailed information about the condition of the rivers so that the effects of any changes and management policies can be monitored.

The Black River itself is badly polluted and therefore supports few aquatic plants apart from the Water Hyacinth (*Eichhornia crassipes*) a south American introduction, which is a serious pest (see below)

The other rivers support both floating and rooted aquatic plants. The Middle Quarters and Broad Rivers both support very attractive and rich aquatic vegetation. Islands of water lilies (*Nymphaea ampla*) are an attractive feature of the Broad River where they provide habitat for both birds (such as Jacanas and Moorhens) and crocodiles. Further upstream in the Broad River there are large beds of *Potamogeton fluitans* and patches of *Ceratophyllum demersum*. In the slower flowing waters of tributaries and the edges of rivers other plants such as the insectivorous floating plant *Utricularia foliosa*. There are extensive submerged meadows of *Chara zeylanica* as well (Bjork, 1983). The aquatic plants provide very important habitats for shrimp and young fish.

The banks of the rivers support characteristic communities, sometimes referred to as riparian swale (Proctor, 1986), and several species of rare plants, for example *Hibiscus striatus* which is known only from the banks of the Frenchman's River and a few similar sites in Cuba.

Riparian communities vary considerably in species composition. They are much richer in the alluvial soils along the Black and YS Rivers than in the peat soils along other rivers (Bjork, 1986). Typically they are dominated by *Phragmites communis* or *Typha angustifolia* and the Giant Swamp Fern *Achrostichum aureum* is common. In the upper reaches of the Broad River, *Cladium jamaicense* and other sedges such as *Scirpus olnei* and *S. validus*, *Cyperus giganteus* and *Fuirena umbellata* which dominate the open herbaceous areas, are also found on the edges of the rivers, as is the rare vine *Ipomoea sagitta*. Along the Black River, between Middle Quarters and YS Rivers there are long stretches where the introduced wild ginger *Alpinia allughas* forms uniform stands along the bank. Further upstream, above Frenchmans, there are areas dominated by the attractive, indigenous *Thalia geniculata*. The latter community is rare in Jamaica.

Several of the rivers in the east of the swamp are of particular botanical interest particularly the Frenchmans River and Styx River. It is characteristic of these rivers that there are few aquatic plants, but along the banks there are very interesting communities. Where the Styx River crosses the Slipe road is a particularly important. The giant calaloo *Amaranthus cannabinus*, *Ipomoea sagittata*, *Anisaia martiniquensis*, various rare sedges, grasses such as *Echinochloa crus-galli* and *Eragrostis elliottii* (which has not been described from any other site in Jamaica), and the swamp vervain *Stachytarpheta angustifolia* (similarly unknown from any other part of Jamaica) are among the interesting plants of these areas.

Permanent ponds - large The largest permanent pond or lake in Jamaica is Wallywash, which is part of the Black River area. As far as is known, there have been no studies of any aspect of the ecology of this lake.

Permanent and seasonal ponds - small The small ponds of the Frenchmans and Slipe area are of biological importance because they support rare plants. Two ponds needing special conservation measures are Campbell's pond and the adjacent pond, near Slipe.

These ponds, surrounded by grassy, savanna-like pasture, include many rare and unusual species, including *Angelonia angustifolia*, *Cheolophyllum jamaicense*, *Curculigo scorzonrifolia*, *Pectis linearis*, *Polygala leptocaulis*, *Reynaudia filiformis*, *Sachia polycephala* and *Sceleria setulosa-ciliata*. Other rare species including *Sagittaria guayansis* and *Heliotropium lagoense*, are found in seasonal ponds in the same area.

The ponds of the area range from the hyper saline mangrove ponds of southern Font Hill to inland freshwater ponds. Mangrove ponds, important to crocodiles and wading birds, are described in the section on wetlands. The freshwater ponds have various origins. Some small ponds on the Hodges property were probably created by

silica sand mining while others behind the berm on beaches are the result of natural processes or beach sand mining. Others such as Spring Pond on the northern part of Font Hill are formed at natural freshwater or brackish springs. Ponds are important landscape elements, very attractive to wildlife and watchers of wildlife.

Freshwater ponds are of importance for ducks, (especially the uncommon Masked Duck) as well as for various species of invertebrates. In the drier areas they attract many animals. Freshwater ponds are not common in Jamaica and few studies of their ecology have been carried out.

Temporary ponds Temporary ponds in the lower morass are thought to be of great ecological importance for waterfowl and juvenile crocodiles. Unfortunately the temporary ponds usually occur in remote, inaccessible parts of the swamp and no studies have been carried out of their ecology. However, several very small seasonal ponds along the Salt Spring road support the rare endemic night-blooming water-lily *Nymphaea jamesoniana*.

Springs There are many small seasonal springs throughout the area including upwellings of freshwater on the coastal shelf. The only known mineral spring in the area is the Black River Spa. Once a popular resort, it is a very attractive clear spring in rather uninspiring surroundings. The yield is 1200 US g/dy. It has a high sulphur content and is potentially good for skin disorders.

Blue holes There are several blue holes near the source of the Broad River. The very attractive red-leaved *Ludwigia repens* is common (Proctor, 1986) and *Sagittaria lancifolia* occurs around the margins. No detailed studies have been carried out in the blue holes.

Seasonal gullies Seasonal gullies are found in the hills around the swamp. Their upper reaches are characterized by larger than normal trees (where these have not been felled).

3 6 1 3 Marine and coastal areas

The marine habitats of the area have never had detailed assessments. The goods, services and attributes of the marine and coastal areas and their contribution to the economy of St Elizabeth are summarized in Table 13.

Beaches (white sand and mud) The beaches along the shores of Parottee, Crane Beach, west of Black River are predominantly white coral sand. West of Black River the seafloor tends to be muddy, as a result of sediments from the plume of the Black River. The muddiest bay is probably Chocolata Bay.

Rocky shores Rocky shores with shallow exposed beach rock and reef are found between Alligator Pond and Parottee Point and in parts of Font Hill.

Cliffed shores Low cliffs of raised reef occur between Alligator Pond and Pedro Fort Charles and around Scotts Cove. These rocky areas are rich in molluscs (such as nerites and chitons) and often include attractive rock pools with many corals, fish, algae and other invertebrates. Such areas are of interest to visitors and should be preserved and incorporated into developments when possible.

Bays The Black River Bay is one of the largest bays in Jamaica.

Brackish and hypersaline coastal lagoons and ponds Parottee Pond is one of the most productive coastal lagoons in Jamaica. It is of outstanding importance for wildlife (see Section 3 6 2 4 below). Undoubtedly it was previously of great importance as a fish nursery but in the 1970s its connection to the sea was disrupted by the construction of a road along the coast. A culvert placed under the road in the early 1980s by NRCA has partly redressed the problem.

TABLE 13 GOODS, SERVICES AND ATTRIBUTES DERIVED FROM ST ELIZABETH CORAL REEFS, BEACHES AND COASTAL WOODLANDS

FUNCTION	SOURCE	PRODUCT
GOODS	1 Mineral resources	Silica and carbonate sand titanium, antimony
	3 Water supply	Springs
	4 Forest resources fuel	Wood fuel for cooking Charcoal - for cooking
	5 Forest resources timber, sticks and bark	Fence posts
	6 Agricultural resources (food, fibre, aquaculture)	Possibilities for mariculture (Irish moss oysters lobsters)
	7 Forage resources	Grazing for goats and cattle
	8 Fishery resources	Finfish Crustacea (shrimp, crayfish, crabs lobsters) Molluscs (oysters conch) Turtles Manatees
	9 Wildlife resources	Subsistence hunting Columbids Waterbirds Turtles Sport hunting Columbids Recreation / tourism American Crocodiles Turtles (potential)
	10 Miscellaneous resources	Dyes - not currently used Craft materials - thatch
SERVICES	1 Water supply	Maintenance of barrier between seawater and swamp water
	2 Coastal protection and water quality maintenance	Berm can protect reefs from runoff Sediment/shoreline stabilization/erosion control/shoreline protection (coastal woodland seagrasses, coral reefs) Sediment/Toxicant retention (seagrasses) Nutrient removal/retention/transformation (algae) Production export (nutrients) and support to neighbouring ecosystems (e.g. coral reefs)
	3 Habitat	Fish and shellfish habitat (including nurseries) Wildlife habitat (including shorebirds and other migrants) Endangered species habitat (American Crocodile, West Indian Manatee rare plants)
	4 Mooring areas for boats	
ATTRIBUTES	1 Biological diversity	Coral reefs
	2 Visual quality/aesthetics/landscape value	Beaches coral reefs coastal dune systems
	3 Education/scientific value	Specially Treasure Beach, Parrotree, Pedro Ponds
	4 Recreational value	Beaches swimming paddling and picnics Diving snorkeling and glass bottom boats coral reefs (specially Alligator Reef reefs off Luana/Font Hill and Parrotree Point) Recreational fishing Coastal boat trips Jet skis speed boats and water skiing
	5 Uniqueness/heritage value	Coastal dunes

Issue 23 *Coastal development is threatening the survival and integrity of Parottee Pond. A large subdivision around the western end of the pond was approved in the early 1970s before the area's ecological importance was appreciated. Lots were created and sold, many of them in the swamp or along the low lying berm between the swamp and the sea, where no construction should have been allowed. Development proceeded slowly at first, along the seafront. Today the pace of development is accelerating in the swamp. New sub-division roads are being created by dumping limestone and parts of the swamp are being filled to create building sites.*

This sub-division is a disaster waiting to happen. Coastal erosion is threatening several residences along the Crane Road. More importantly, the area has a high flood potential. The next hurricane or severe storm could damage or flood many homes.

Pedro Ponds Behind Great Pedro Bay lie a series of ponds, with salinities ranging from fresh to hypersaline. The largest is Great Pedro Pond, which is one of the most important habitats in Jamaica for migrant shorebirds and ducks. Other smaller ponds provide habitat for the rare and beautiful Pancake Rose *Nelumbo lutea*, which, in Jamaica, occurs only in St Elizabeth. The ecology of these ponds has never been studied, but one rare endemic aquatic reptile - the Jamaica Slider or Pond Turtle survives there (Section 3.6.2.4). The Pedro Ponds are surrounded by huge Taino middens which have never been excavated or even comprehensively mapped.

Issue 24 *Great Pedro Pond, like Parottee Pond, is threatened by an old subdivision plan, that would be allowed if it was proposed now. With roads that lead straight into the water and no provision for wastewater treatment, this subdivision is potentially disastrous. The pond will either dry up and become a dustbowl or accumulate waste water and become a health hazard. This is a tragic waste of a potential beauty spot and tourist attraction. A study of the pond and recommendations for appropriate management are urgently needed.*

There are many small ponds at Font Hill, whose extent and salinity vary with rainfall. Most of these ponds are fringed with mangroves and are important for crocodiles and wading birds.

Tidal mud flats Mud flats are specially important habitats for shorebirds and molluscs. They are rare on the shores of Jamaica. Mudflats are found at Font Hill.

Silicaceous sand dunes Silicaceous sand areas are well known for supporting characteristic floras, usually including scrophulaceous plants. The silicaceous dunes and plains of the Black River area, found south of Thatchfield, west of the morass and in the Hodges area have never been studied in detail. They have all been seriously disturbed through creation of pasture and sand mining and much of their characteristic vegetation has probably been lost. The dunes of Thatchfield are dominated by introduced species (e.g. guango, limes and logwood), with a few scattered indigenous trees such as sweetsop and *lignum vitae*.

Issue 25 *Removal of vegetation and disturbance of dunes reduces their stability and ecological functions.*

Issue 26 *The shortage of sand for construction in Western Jamaica means that there is a large demand. However, sand dunes are of ecological importance and are natural landmarks. Many are associated with Taino sites.*

Seagrass beds Seagrasses grow where the seafloor is shallow and protected (for example, between the reef and the shore). The seagrass beds provide shelter and food for many types of fish, lobsters, conch and other shellfish. The roots of the seagrasses bind the sediments of the seafloor and prevent erosion.

Extensive seagrass beds line the coast of St Elizabeth, specially at Alligator Reef, Great Pedro Bay and Luana/Font Hill. Turtle grass (*Thalassia testudinum*) is the most abundant species but Manatee Grass (*Syringodium filiformis*) occurs in some places (e.g. Font

Hill) Seagrass beds are usually important as fish nurseries and should be conserved whenever possible

Issue 27 Impact of water quality on seagrasses There are no data about the status of seagrasses along the St Elizabeth coast Dredging, sewage and urban run- all threaten the health of seagrass beds in the parish

Coral reefs Coral reefs support a great diversity of living creatures including commercial varieties of fish and lobster They protect coasts from the effects of hurricanes, prevent coastal erosion and contribute to beach formation Although the reefs of St Elizabeth tend to be affected by muddy water and have few fish, they have potential value as tourist attractions

There are fringe reefs at Alligator Reef, between Alligator Pond and Parottee Point, across Black River Bay and at Font Hill There are scattered patch reefs and coral heads in shallow areas along the coast Only the reefs around Alligator Reef and Treasure Beach are regularly visited by tourists

Alligator Reef is about 3 km southwest of Old Womans Point It is about 3km in length and forms a gentle arc facing the southeast There is a sand bank which is partially exposed at low tide Elkhorn coral (*Acropora palmata*) is the dominant species The reef is damaged by storm waves and silt deposition In the late 1960s and early 1970s area was popular for sport fishing but by the late seventies there were few fish to be seen

Very little is known of the status of reefs of St Elizabeth, especially those east of Black River An inventory of the reefs is needed, both to identify potential spots for diving and snorkeling and to provide baseline information about marine conditions

Coral reefs are among the most fragile of marine ecosystems They take hundreds of years to form and are slow to recover from damage such as dynamiting, collection of corals for sale, and damage from

anchors and grounded boats Removal of fish by spear fishing, the effects of sediments, freshwater, and increased nutrients, as well as diseases such as coral bleaching, all upset the ecological balance of coral reefs and cause them to become overgrown by algae

Issue 28 - Black River nutrients plume The largest source of nutrients in the coastal waters is the Black River system The plume stretches several km out to sea, and affects the coastline from Parottee Point west to Font Hill

Issue 29 - Eastern sources of nutrients Currents running from east to west along the coast ensure that nutrients and sediments that enter the sea to the east will eventually affect the west Thus the effects of deforestation in the upper Rio Minho watershed or the hills above Alligator Pond will be observed as increased sedimentation in St Elizabeth

Issue 30 - Deforestation in upper watershed Removal of forests as a result of poor land use practices (including clearance of forests for agriculture, mining and housing) on steep slopes reduces the retention capacity of the soils, causes severe erosion and flash flooding during heavy rain, with consequent damage to reefs and seagrass beds

Issue 31 - Removal of herbivores from reefs by spear fishing contributes to overgrowth of algae, also encouraged by high nutrient levels

Issue 32 - Use of Alligator Cay is increasing as people visit the area to dive, fish and picnic The effects on the area have not been assessed

3 6 1 4 Plateaux and Plains - agricultural land

The flat lands of St Elizabeth have long been under agriculture. The extensive Taino middens suggest large settlements, no doubt with associated canuco cultivation. The Spanish would have taken advantage of existing cleared lands, to establish hatos (or ranches) at Pedro and Santa Cruz/Lacovia as well as Black River. Little has been written of the early settlement history of the parish.

Sugar cane Sugar cane cultivation dates from Spanish times, and survives mainly at Appleton and Holland estates. Appleton is one of the most successful estates, probably because of its rich deep alluvial soils and abundant supplies of fresh water. Sugar cane production *per se* appears to be broadly sustainable on such land, requiring even today a minimum of fertilizers and pesticides. However the disposal of sugar cane wastes, particularly the dunder from Appleton's distillery, is one of the most controversial topics in St Elizabeth.

Dumped into a sinkhole near the distillery the wastes flow underground before emerging into the One-eye River and Grass River, tributaries of the Black River. These wastes are still highly offensive when they enter the Upper Morass, at Newton and Elim, more than 3 and 6 km from the source, respectively. Even at Lacovia Bridge the river carries thick black sediments and smells of dunder at certain times of year. People along the entire length of the river complain of the pollution, claiming that it destroys their livelihood by killing fish and shrimp and affects their health.

So far there is little sign that either Appleton's 1995 promise to find alternative uses for some of the dunder or its 1997 promise to install biodigesters have been honored.

Plantation forestry Generally there is little plantation forestry in the parish. Christmas trees are grown on the Santa Cruz Mountains near Malvern. Caribbean Pines have been planted in some Forest Reserves.

Mixed agriculture As in the rest of Jamaica, many small farmers practice mixed agriculture on small lots.

Slash and burn agriculture Slash and burn agriculture is most prevalent in the hills of the Cockpit Country.

Dykes and levees A few farmers grow crops, including dasheen, bananas and ganja, on peat soils in the lower morass, using specially constructed dykes and levees.

Dryland farming A unique system of agriculture has evolved on the Pedro Plains. Land passed through a three-phase rotation, including a) preparation and planting of crops (e.g. tomatoes, water melon, scallion) and mulching with dried guinea grass, b) after the crops have been harvested, guinea grass is planted, grown to maturity and harvested for mulch, and c) after the grass has been harvested goats and cattle are fed on the stubble. In this way soil fertility has been maintained for many years and crops are grown with a minimum of rainfall and irrigation.

Issue 33 In recent years some farmers have taken advantage of piped water supply. Many illegal connections were made to the mains and treated domestic water was drawn out of the system to water crops, thus depriving households further down of drinking water. The NWC has prosecuted several farmers and the number of illegal connections has been reduced. Nevertheless there is a great demand for irrigation of the Pedro Plains (see section 3.7)

As a result of WTO free trade policies, cheap vegetables and meat are being dumped into Jamaica at prices below the production costs in St Elizabeth. This threatens the survival of this method of farming.

Farmers are encouraged by seed companies to use imported seeds (for varieties requiring large amounts of fertilizers and water). No effort is being made to conserve local, drought-resistant varieties of crops and livestock.

Pastures Pasture is one of the most extensive land uses in the parish, usually on land that is not suitable for other types of agriculture. The type of grass, livestock and carrying capacity varies with rainfall and soil. Centers for livestock production and dairying include the Santa Cruz plains (including dairies at Pepper and Goshen), the Newmarket plateau and dry plains of southern St Elizabeth. The wetter areas (e.g. YS and Biscany) support famous breeding herds of pedigree Jamaican Red Poll Cattle. Brahmin cattle thrive in the drier areas and are also bred at YS. Until recently there were herds of sheep on the Pedro Plains and around Treasure Beach, but these are becoming very rare. Even goat raising is declining in the area, as praedial larceny increases and prices decrease. Racehorses are bred at YS.

The Lignum Vitae-Seymour Grass savanna is a man-induced habitat, which gives a distinctive visual character to the environs of Treasure Beach. Maintained by grazing goats and sheep, it is threatened by the decline in livestock rearing, conversion of agricultural land to housing (including ribbon development) and cutting of lignum vitae trees without replanting.

The attractive Guango savanna, which was once a feature of land on either side of the road from Black River to Whitehouse, has largely been destroyed.

Issue 34 Cutting of trees on flat land has a significant impact on the attractiveness of the area as well as on soils and microclimates

Issue 35 Livestock farming has been an essentially sustainable form of land use in many parts of the parish for hundreds of years but it seems to be increasingly unprofitable. The effects on the rural economy and environment could be severe

Cattle are also grazed in and around the upper and lower morasses, where they pose a major impediment to regeneration of swamp forests and mangroves.

Issue 36 Consideration should be given to excluding cattle from selected areas of the morasses

Pimento There are many pimento properties in the Santa Cruz Mountains. Pimento processing produces polluting waste.

Aquaculture The largest aquaculture development in St Elizabeth is at Barton's Isle in the Upper Morass where Jamaica Broilers has established extensive ponds. There are also ponds near Bogue and Braes River. When improperly managed, wastes are discharged.

Food forests In the past many small holders established food forests on marginal land. The typical food forest included a mixture of fruit trees such as breadfruit, otaheiti, guava, mango, citrus and ackee. The profitability and therefore survival of this type of sustainable land use is threatened by praedial larceny, which has caused many rural people to cut down their fruit trees. Epidemic diseases affecting citrus and breadfruit have also depleted these forests.

3 6 2 Flora and Fauna

Jamaica's heritage of biodiversity is not high compared to continental countries, but compared to other oceanic islands it is outstanding. Jamaica has more endemic birds than any other Caribbean island and high levels of endemism among many other groups of animals and plants. Many endemic species are also rare, and vulnerable to changes in their fragile habitats. The highest levels of biodiversity in Jamaica are found in the Cockpit Country, and many other areas of importance are found throughout St Elizabeth (Figure 13).

Despite their potential value, the possibilities for Jamaica's fauna and flora to provide resources such as drugs and raw materials, or to be used in horticulture, forestry or biological control of pests has hardly been explored. This is related to a generally low level of knowledge of the natural ecosystems and their species, and to the difficulties and expense of research and development.

3 6 2 1 Endemic, rare and endangered plants of the mountains

The Cockpit Country is renowned for its high levels of plant biodiversity. Many of Jamaica's more than 800 endemic species of plants occur in the wet limestone forests of Cockpit Country, including 101 species that do not occur elsewhere.

Drier areas such as Redgate (near YS) also have locally high levels of biodiversity and several plant species known only from this locality.

Generally the driest areas have the lowest levels of endemism, but in St Elizabeth interesting and unique species are found even in the driest habitats. A natural hybrid orchid was once found in Luana-Font Hill (*Broughtonia sanguinea* x *negrilensis*) but the majority of plants were removed by the Jamaica Orchid Society in order to "save" them.

A Lovers' Leap endemic, *Verbesina propinqua*, survived until the 1990s, but the last remaining stand may have been destroyed during construction of the restaurant. St Elizabeth has a rich cactus flora, including several endemic species.

Issue 37 Deforestation (as a result of timber extraction, cutting of pot and yam sticks, fire, cultivation, expansion of settlements, and mining) is the greatest threat to the forests of St Elizabeth. There is a need to licence (and tax) chainsaws as well as sawmills.

Issue 38 Birds spread seeds of forest trees, including commercially important species. Therefore depletion of bird populations reduces the ability of forests to regenerate.

Issue 39 Cactuses (especially the endemic Turk's Cap, or Mother-in-Law's Seat) are harvested (often stolen) from the wild with no replanting.

3 6 2 2 Endemic, endangered and rare plants of the wetlands

The Black River Lower Morass supports more rare plants than any other wetland in Jamaica (see also section 3 6 1). There are no data on the flora of the upper morass. Rare plants are found mainly along banks and in small ponds.

TABLE 14 FLORA OF BLACK RIVER

ATTRIBUTE	NUMBER OF SPECIES	PERCENT
Total number of species	207	100
Number of endemic species	11	5
Number of rare species	22	10

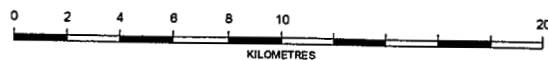
Issue 40 Specific threats to rare plants in the lower morass include road widening, which could threaten roadside habitats for rare night-blooming waterlilies, and any other factors that contribute to the degradation of the morass (see section 3 5 1).

ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

Figure 13
Species

- LEGEND**
- Morass / Wetland
 - Mangrove
 - Parish Boundary
 - Road Class A
 - Road Class B
 - Road Class C
 - Railway
 - Seasonal Gullies & Drainage Features
 - Small Rivers & Streams
 - Large Rivers
 - Ponds
 - Local Endemic Species
 - Rare Plant Localities
 - Crocodiles
 - Limkins
 - Cranes / Rails
 - Shore / Land Birds
 - Ducks
 - Doves / Pigeons
 - Turtle Nesting Areas

- ① LUANA / FONT HILL
 - A. Important Bird Area (West Indian Whistling Ducks Masked Ducks Migrant Shore Birds or Land Birds)
 - B. Important Turtle Nesting Area
 - C. Important Crocodile habitat (Current status not known)
 - D. Previously important for Manatees (not seen recently)
- ② MALCOLM BAY
 - Important Turtle Nesting Area
- ③ PAROTTEE PONDS
 - A. Important Bird Area (West Indian Whistling Ducks Least Terns Migrant Shore Birds)
 - B. Important Crocodile habitat
- ④ WALLY WASH POND
 - Important Bird Area (West Indian Whistling Ducks)
- ⑤ PEDRO PONDS
 - Important Bird Area (Migrant Shore Birds)



Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services Inc. Technical Assistance Contractor to the GOJ-USAID Development of Environmental Management Organizations (DEMO) Project. July 1998



3 6 2 3 Endemic, rare and endangered animals - mountains

There are high levels of endemism among animals of the Cockpit Country, specially frogs and lizards. Ninety three percent of the frogs and seventy three percent of the lizards and snakes in the Cockpit Country are endemic - and new species are still being discovered.

TABLE 15 LEVELS OF ENDEMISM IN SELECTED GROUPS OF ANIMALS IN COCKPIT COUNTRY

GROUP OF ANIMALS	NUMBER OF SPECIES IN COCKPIT COUNTRY			
	TOTAL ENDEMICS	COCKPIT SPECIES	JAMAICAN ENDEMICS	% ENDEMICS
Amphibians -frogs	16	2	14	93
Reptiles	22	3	16	73
Birds	79	0	26	32
Butterflies	72	0	11	15

Birds Jamaica has 25 species of endemic birds, the highest number of any oceanic island in the world. All Jamaica's endemic birds can be found in the Cockpit Country, plus two rare sub-species, the Golden Swallow (possibly extinct) and Plain Pigeon.

Land Snails Jamaica has more than 500 endemic species of land snails, many of which can be found in St. Elizabeth. One site in the north of the parish has the highest density of endemic land snails so far discovered anywhere in the world.

Indian Coney or Jamaican Hutia The Jamaican Hutia (*Geocapromys brownii*) is an endemic brown rodent about the size of a rabbit. Mainly nocturnal, it inhabits rock crevices and tree roots in wooded hilly areas. Its distribution in St. Elizabeth is not known, although it may survive in the Cockpit Country. Nationally its populations are declining because of hunting and habitat destruction.

Bats There are twenty one species of bats (*Chiroptera*) in Jamaica, including 5 endemic sub-species, of which one is an endangered genus. Although not generally considered attractive, bats are of considerable ecological importance. Species such as *Artibeus jamaicensis* are frugivorous and are important dispersers of tree seeds in the natural forests. Seeds of many commercially important wild trees, including soursop, starapple, breadnut, almond and pawpaw are distributed by *Artibeus*. Species such as *Pteronotus* and *Macrotus* are insectivorous and help to keep insect populations under control, while others (such as *Monophyllus*) feed on pollen and pollinate many plants of actual and potential economic importance. Most bats roost in caves, where their accumulated droppings form guano.

Issue 41 *The survival of many bat colonies and their fossil reserves is threatened by guano mining.*

Insects The endemic Giant Swallowtail butterfly occurs in the Cockpit Country as do several other endemic butterflies.

Issue 42 *Illegal collection of butterflies for sale is a threat to the survival of some species.*

Butterfly ranching has potential as a source of revenue for local communities and for protected areas, but should be organized centrally to maximize revenues for protected areas, ensure equitable profit-sharing and to prevent illegal activities.

3 6 2 4 Endemic, endangered and rare animals - Wetlands

Jamaican Rice Rat This small diurnal brown and yellow rat with white feet (*Oryzomys antillarum*) lived in the hollow tree roots, rocky gullies and holes in river banks. Considered extinct, it might persist in remote areas, such as parts of the Upper Morass.

West Indian Manatee Manatees (*Trichechus manatus*) were once common in the Black River Bay and the Black River system.

Fishermen capture them whenever they have the opportunity. Several manatees were slaughtered and sold in Black River in the early 1990s. As a result they have become very rare and the national population is estimated at less than 50.

Issue 43 *More public education, effective enforcement and habitat protection are required to ensure the survival of this species*

Caribbean Monk Seal Hundreds of years ago Caribbean Monk Seals (*Monachus tropicalis*) were common around Caribbean coasts (including the Jamaican mainland and the Pedro banks). Scotts Cove is called Seals Cove on some old maps, perhaps because they used to be seen there. The species is probably extinct as a result of over-hunting.

Issue 44 *The loss of the Caribbean Monk Seal, a beautiful and valuable species, should be used as an object lesson in environmental education*

Birds Of the 197 species of birds which occur in the Black River area, 60 (31%) are ranked as rare in Jamaica. The most important rare species are the West Indian Whistling Duck, Black Crake and Spotted Rail.

Issue 45 *The West Indian Whistling Duck, a Caribbean endemic, is declining throughout its range and is internationally recognized as endangered. Black River is its most important habitat in Jamaica. Some research has been carried out but more is needed if an effective conservation program is to be devised.*

Migratory shorebirds are generally declining in numbers. Ponds at Parottee, Font Hill and Great Pedro Pond are of great importance for many species, which use the sites in transit or over-winter there. These sites are considered to be of international importance. The seasonal aggregations of birds at these ponds are dramatic and interesting and deserve conservation and interpretation for visitors.

TABLE 16 BIRDS OF BLACK RIVER AREA

Endemic species	15
Endemic sub-species	14
Resident species	44
Summer residents	8
Summer migrants	1
Winter migrants	52
Transients	21
Vagrants	27
Introduced species	4
Rare species	60 (30%)
TOTAL NUMBER OF SPECIES	197

Although only 15 of the 27 Jamaican endemic species are found at Black River, the diversity is very high (197 species) because of the large number of migratory waterfowl which can be observed there, many of which are rarely seen elsewhere. Parottee Pond, in particular, is a rich habitat for migrants.

Issue 46 *The survival of Parottee and Pedro Ponds as waterfowl and shorebird habitats of national importance are threatened by inappropriate development of surrounding land.*

Freshwater Turtles The attractive and interesting endemic pond turtle - the Jamaica Slider - (*Trachemys terrapen*) is quite common in freshwater and brackish ponds of south St Elizabeth, including Black River and Font Hill and Treasure Beach.

Issue 47 *Conservation of small ponds should be a priority.*

Marine Turtles Five species of marine turtles occur in Jamaican waters. Of these, three - the Hawksbill (*Eretmochelys imbricata*), Green Turtle (*Chelonia mydas*), and the Loggerhead (*Caretta caretta*) - are known to occur between Black River and Savanna-la-mar (Table 17). Surveys of Jamaica's sea turtles and nesting beaches have shown that Malcolm Bay has very high density of nesting relative to other beaches islandwide while Luana/Font Hill is one of the few beaches where all three species have been recorded.

Hawksbill turtles make up the majority of Jamaica's nesting turtles. They do not nest in large groups. It is unlikely that observing sea turtle nesting could be an important tourist attraction in Jamaica although any opportunity will be of great interest. However, turtles on the beaches of St. Elizabeth are still subject to intense exploitation, with nesting females and hatchlings being specially at risk. Adults are also taken with fish guns and caught incidentally in nets. Unfortunately, the judiciary are still apparently unaware of the critical importance of protecting sea turtles and penalties do not match the severity of the offence (personal communication, Merrick Gayle, Tony Freckleton, Michael Spence, May 1997).

Issue 48 *The Sea Turtle Recovery Action Plan (STRAP) should be completed, circulated and implemented as soon as possible*

American Crocodiles The American Crocodile (*Crocodylus acutus*) is found throughout the wider Caribbean but is generally declining and is considered an endangered species by the IUCN. In Jamaica it is usually found on the south coast. Until the early 1990s Font Hill and Black River were the most important places in Jamaica for crocodiles. Their current status is not known.

The most important limiting factor for crocodile populations is the availability of undisturbed nesting habitat - including sandy beach berms and sandy or rubbly ground in the morass. Effective protection of an adequate amount of nesting habitat is essential for the survival of crocodiles. There have been several proposals to create a crocodile reserve at Font Hill.

Issue 49 *The Crocodile Working Group is developing an action plan, including public education and law enforcement as well as protection of critical habitats. Particular attention should be paid to protection of nesting habitats in the Black River area, without which this valuable population will die out*

Lizards At least nine of Jamaica's 24 species of lizards are found in the project area. In addition one species, very rare or extinct species, the Giant Gallywasp (*Diploglossus (Celestus) occiduus*), a nocturnal skink might survive in the area.

TABLE 17 AMPHIBIANS AND REPTILES OF BLACK RIVER

Total species	20
Number of Endemic Species	10 (50%)
Number of rare species	2
Number of "extinct" species	1

Fish Two species of small "ticky-ticky" fish which are confined to the upper reaches of the Black River system (*Cubanichthes pengellii* and *Limia melanogaster*) are among the rarest freshwater fish species in Jamaica. They are limited to the upper reaches of the river system. Little is known of their life cycles and ecological requirements. They are strikingly colored and are easily kept in aquaria, thus may have some value as exportable decorative (pet) fish.

Annelids At Font Hill there are very unusual and interesting coastal formations built by polychaete tube worms. In his proposal for management of Font Hill dated 1988, Hendry says "These structures are not very common, either in Jamaica or elsewhere, and should be preserved and protected."

3 6 2 5 Species of economic importance - plants

a Thatch Thatch from the Bull Thatch is used to make baskets and craft items. There is a shortage of thatch leaves and replanting has been suggested.

b Timber trees (e.g. cedar, mahogany, lignum vitae) Theft of timber trees by itinerant chainsaw operators is a major problem throughout the parish.

c Pot and yam sticks Extraction of yam sticks and sticks to make fish pots is a thriving business worth millions of dollars annually. Most sticks are stolen from government and private lands as far afield as the Don Figuerero Mountains.

d Mangrove poles for construction Mangrove poles, especially long straight posts from Red Mangroves and shorter poles from Black Mangroves, are harvested, often illegally, by boat. They are used in construction of simple houses and chicken coops.

3 6 2 6 Species of economic importance - animals

a Fish and marine resources No data are available about the marine communities of the coral reefs and seagrass beds of St Elizabeth. Fishing is an important way of life in coastal communities such as Alligator Pond, Great Bay, Frenchmans Bay, Black River and Whitehouse. However, inshore fisheries have been affected by overfishing and declining reef quality. The main fishing grounds for St Elizabeth fishermen are the New, Blossom, Walton and Pedro Banks.

Issue 50 The conservation of banks, especially Pedro, is a priority for the welfare of local fishing communities

Altogether, 35 species of fish have been recorded from the Black River Morass of which 3 are endemic and many others are of commercial importance.

The commercial fishery of the morass is an artisanal, conducted from traditional wooden dug-out canoes and with simple fishing equipment. Fishermen use small Z-shaped Antillean traps, gill nets, spearguns and hooks-and-lines, as well as shrimp and crab pots. The design of the shrimp pots is identical to shrimp pots used in West Africa.

More than half the scale-fish catch is *Tilapia*. Mudfish and bullhead (*Dormitator* spp.) make up a further 10%.

The economic value of the fishery of Black River and Parottee (excluding the coastline west to Luana) was estimated at a minimum of US\$1 million in 1981 (Aiken, 1982) and US\$3 million in 1986 (Garrick, 1986) or about 400 kg per annum for 1,000 fishermen (Maltby, 1986). If catches remain at the same level, this would mean an annual income of US\$1200 at 1991 prices."

Issue 51 Many commercial varieties of fish (including snappers and jacks) spawn at sea, but the juveniles move into the morass or coastal lagoons to take advantage of the protection of food-rich shallows. Salinity gradients are of great importance to many species of fish, therefore changes in the water regime of the morass (for example decreased flows, as a result of increased abstraction of water for irrigation) could decrease fish and shrimp populations

Shrimp and crabs Seven species of shrimp are included in the commercial catch of fishers in the Black River Lower Morass. The most common is *Macrobrachium acanthurus*. The shrimp live mainly among the roots of aquatic plants in the intricate network streams and springs in the morass. Some species migrate to the bay to breed.

Blue swimming crabs of the genus *Callinectes* are sometimes taken in nets and special crab pots in the lower reaches of the rivers. A

processing plant for crabs was established at Salt Spring (Is it still in operation?) Black Land Crabs (*Geocarcinus ruricola*) are hunted in all the coastal wetlands, but specially at Luana. Crabs, like shrimp, are a resource whose economic importance, status and needs for management and conservation have never been assessed.

Issue 52 *Despite the economic importance of the shrimp and crab industries, the biology of the shrimp has never been studied and is not fully understood. A thorough study of the ecology of the shrimps, including suggestions for conservation of critical habitats and for habitat management to increase the sustainable yield of shrimps, is urgently needed.*

Frogs The Bullfrog *Rana catesbiana* was introduced to the morass in the 1970s in the hope that a frog leg industry could be established. The frog survives in the morass but there is little interest in harvesting it for food.

Game birds In St. Elizabeth, as in the rest of the country, there is a long tradition of game hunting. The legally designated game birds include the Mourning Dove, White-winged Dove and White-crowned Pigeon. Birds that are shot illegally include Ring-tailed Pigeons, and Plain Pigeons in the mountains, and ducks (including West Indian Whistling Ducks) in the morasses. Illegal hunting is the main threat to the survival of West Indian Whistling Ducks (see above).

Issue 53 *Illegal shooting in Game Sanctuaries and Reserves, particularly the Black River Upper Morass, exceeding bag limits, shooting out of season and shooting of protected species (including ducks) is threatening game birds and non-game bird in game bird habitats. There are no data to indicate the scale of abuse, but it is obvious that the existing system of NRCA wardens assisted by honorary game wardens is not adequate to address the problem.*

Crocodiles The main attraction on Black River boat trips are crocodiles. A rough calculation in Box 5 suggests that the value of a

living crocodile in Black River is US\$125,000 per year, or about US\$3.7 million over a typical lifetime of 30 years.

BOX 5 VALUE OF A LIVING CROCODILE ON BLACK RIVER

Cost of tour per person (US\$)	20
Value of tours/year	1,248,000
Value of crocodiles (80%)	998,400
Number of crocodiles	8
Annual value of crocodiles (8)	124,800
Lifetime value of crocodile (30 yrs)	3,744,000
J\$ value	134,784,000

Issue 54 *Crocodiles are an endangered species and special protection measures are needed (see also Issue 49).*

3.6.2.8 Pest species - plants

d Mountains and hills -- growth of invasive exotic species such as bracken on land cleared for cultivation and subsequently abandoned interrupts normal regeneration of forests. A control program for invasive plants is urgently needed for forest areas and especially in the Cockpit Country.

b Wetlands -- Water hyacinth Water hyacinths, introduced to Jamaica because of their ornamental flowers have become established in many eutrophic waterways and ponds. They block waterways and reduce productivity by excluding light. The Black River, enriched by the dunder from Appleton among other pollutants has long been affected by hyacinth. Until recently it was cleared manually by employees of the National Irrigation Committee (NIC). In 1998 the NIC acquired a floating machine that can remove and macerate the weed. It is hoped that this will improve their capacity to keep the river clear.

The possibility of using other methods to control the weed (such as introducing a weevil that eats it) should be carefully considered. Water hyacinth has been used as a craft material and in making furniture, rope and paper. With a water content of more than 80% water it is expensive and difficult to harvest and dry. The cost of processing could be higher than the value of the material itself. However, efforts are being made in Indonesia, Africa (around Lake Victoria in particular, and elsewhere) to develop economic uses as an incentive for local residents to help clear the weed and as an alternative source of income for fishermen impacted by reduced fish stock and reduced access. Experience with these efforts should be monitored closely.

Melaleuca (Bottle-brush) Melaleuca has become established in the Upper Morass and seems to be invading the Lower Morass. This species is now a serious pest in the Everglades and should be eliminated from Jamaican swamps before it becomes widespread.

Logwood Logwood was introduced as a dyewood in the 18th century. It was widely cultivated and was the basis for Black River's prosperity at the turn of the century. Still widely used as fence posts, it spreads rapidly into abandoned pastures and becomes a pest.

3.6.2.9 Pest species - animals

a Mountains and plains -- Pest birds Due to habitat loss, some bird species are using crops as alternative sources of food and are therefore considered pest birds. They include White-wing and Mourning Doves in rice and sorghum and parrots and parakeets in oranges and corn.

b Wetlands and beaches -- Mosquitoes Mosquitoes can be a problem at certain times of year near the coast and wetlands. Most tourist villas and hotels have to be screened to reduce the nuisance, and from time to time aerial spraying is carried out, using malathion.

Issue 55 Aerial spraying in coastal wetlands Malathion kills beneficial insects as well as mosquitoes. The effects of aerial spraying on the coastal ecosystems of Jamaica have not been evaluated but are unlikely to be beneficial. Alternatives to spraying should be sought.

Sand flies Sand flies are a menace on many beaches of St Elizabeth. They flourish where freshwater meets saltwater on sandy beaches and can be controlled by careful water management.

Mongoose The mongoose (*Herpestes auropunctatus*) was introduced in 1872 to control rats which had become a serious pest in canefields. By 1890 they were a pest themselves. They are now common throughout the island including the drier parts of the morass.

Sharks and rays Tiger sharks and nurse sharks have been reported outside the reefs east of Black River and inside the reef at Font Hill. Sting rays and electric rays are found in the muddy shallows along the coast, particularly west of Black River at Font Hill.

Issue 56 Sharks and rays pose a hazard to divers and swimmers Their occurrence should be studied and recommendations made to mitigate threats as necessary.

3 7 Population and Settlement

3 7 1 Settlement History and Patterns

The first part of Chapter 2 gave a brief indication of how the interactions between the successive occupants of St Elizabeth and the varied suitability of the land for agriculture have produced a variety of settlement patterns. The relatively densely populated areas, the Pedro Plains, southern coastal communities, Malvern Hills and Essex Valley contrast with the sparsely populated morasses, western savannas, central sugar estates and northern mountains.

3 7 2 Population and Settlement Trends

This EPF is being drafted seven years after the latest census (1991). It appears that the past seven years have been a time of significant change. However, there are no statistical data to document recent trends in population and living conditions.

The population of the parish in 1991 was 144,800, not much more than a 100% increase over the 62,200 figure one hundred years previously. The highest period of growth was between 1921 and 1943 when net immigration to Jamaica reflected United States immigration restrictions. Annual rates declined to below 1% thereafter. However, the 5.8 percent increase over 1982 was the lowest ever recorded over the 100-year period.

Approximately 10% of the population were urban in 1991, up from 5% in 1970. A majority of this growth occurred in Santa Cruz whose population rose from 2,000 to 8,000 over the twenty years, an annual average growth rate of 7% (see Table 18). Balaclava and Southfield are the other growth centers with growth rates of 2.9% and 2.3% respectively over the same period. By contrast, the parish seat Black River grew by an annual average of 1.4% over the period. Most of this growth occurred in the 1970s, in the 1982-1991 intercensal period the size of the town remained almost static. The Junction/

Bull Savanna area was the second largest urban area in 1991. Its growth rate was only a little greater than Black River's. The Magotty and Mountainside areas were the only ones to experience a decline in population over the 21-year period.

TABLE 18 POPULATION OF SPECIAL AREAS, 1970-1991

Special Areas	1970	1982	1991	Annual Average Growth Rate
Black River	2,701	3,601	3,590	1.36
Santa Cruz	2,050	5,979	8,144	6.79
Balaclava	1,553	2,682	2,837	2.91
Magotty	1,753	974	1,359	-1.20
Lacovia	2,478	2,939	3,159	1.16
Newmarket	1,793	1,945	2,100	0.76
Bull Savanna/ Junction	5,110	5,892	6,888	1.43
Nain	1,830	2,329	2,373	1.25
Mountainside	1,247	1,519	1,048	-0.82
Southfield	1,652	2,359	2,671	2.31
Newell	1,442	1,638	1,769	0.98
Malvern	2,435	2,647	3,262	1.40
Siloah	2,496	2,560	2,701	0.38

Source: Statistical Institute of Jamaica. Population Census 1991, Volume 1, Part 11, Parish of St Elizabeth.

The density of settlement of the 1,212.4 sq km parish has remained low, at 119/sq km in 1991 (up from 83/sq km 1943). Only three other parishes recorded lower densities in 1991.

The population is still young but aging, the median age having risen between 1970 and 1991 from 15.7 to 21.6 for males and from 16.6 to 22.3 for females. The downward trend in fertility over the period was reflected in a decline in the youngest (under 15) age group from 48.6% to 36.2% for males and from 47.1% to 35.8% for females. The average size of the 35,532 households in 1991 was 4, small relative to other regions.

While the growth throughout the parish has been small, there is little evidence of rural depopulation. The population is being augmented by a small but growing number of returning residents. Many of these returnees are retired or close to retirement. The population of 146,000 at the end of 1992 was 5.9% of national total, down from 6.0% end of 1991 (compared with 9.7% in 1891).

Beneath these figures is a picture of relative stability in a parish that has avoided the severe disruption of the rural population and the problems of under-employed new urban residents that characterize the major tourist centers and their hinterlands. However, over the past five years, Treasure Beach has seen the immigration of the hangers-on who typically follow the establishment of new centers of tourist expenditures. In addition, since announcement of the construction of Beaches at Whitehouse, vendors and squatters have moved into that community. It is also reported that vendors from outside the local community have moved into the area of the Font Hill Beach since PCJ completed construction there.

Issue 57 An adjustment in thinking about growth is needed. The character of St. Elizabeth that is valued by residents and visitors has been based on stability, tight-knit communities, self-reliance and care for the environment. Decisions to introduce major new development or growth-inducing activities need to be examined in the context of their effect on the relative prosperity that has been sustained for many decades. Growth should build on regional assets rather than formulae developed in other regions and should be able to raise the quality of life for all existing residents and especially for the less well off rather than attracting in-migration.

3.7.3 Living Standards

In 1991 there were 33,163 housing units, 34,735 private dwellings and 97.6% of living units were detached houses, the highest percentage of all the parishes.

STATIN reported that in 1991 approximately 66 percent of housing units were made of concrete. Observation suggests that that percentage has risen since then, although STATIN also reported that in 1990-91 some 20% of new houses were built of wood. Nevertheless, the reconstruction of wooden houses with concrete blocks appears to be accelerating. Many of the wooden houses that lent rural St. Elizabeth much of its charm have disappeared. Unfortunately, only now are some residents beginning to regret the loss and to recognize that keeping up with what is thought to be modern and fashionable has a price, individually and collectively. In 1991,

12.5% of the housing stock was made exclusively of wood. If outer walls with a mixture of wood and concrete or wood and block are added, the percentage was some 20% (the figure reported by the Survey of Living Conditions and the 8th highest percentage in Jamaica).

Issue 58 Many historic buildings, large and small, that seem to be degraded beyond repair should be evaluated carefully before being replaced rather than restored, as Invercauld Great House and others demonstrate, there are greater and more sustainable benefits to achieving landmark status than becoming anonymous.

In 1991, St. Elizabeth's percentage of housing units with indoor water was the third lowest in Jamaica. The figure was 11.2% according to the Census and 13.2% according to STATIN, Survey of Living Conditions, 1992). The parish was third highest in terms of the percentage with a rainwater tank (STATIN, *ibid*).

The number of housing units without toilets declined between the censuses (Table 19). However, in terms of environmentally sound sanitation, the overall situation worsened over the period.

The share of houses with electric lighting, 40.3%, was the lowest in the country in 1991 according to the Survey of Living Conditions. The 1991 Census figure was 41.9%, up from 24.5% in 1982.

While kerosene was the predominant source of lighting in 1991, wood and charcoal were the predominant cooking fuels (Table 20)

TABLE 19 DISTRIBUTION OF PRIVATE HOUSEHOLDS IN ST ELIZABETH BY TYPE OF TOILET FACILITIES, 1982 AND 1991

Type of Facilities	1982		1991	
	No	%	No	%
No Toilet Facilities	2,530	9.1	1,739	5.2
Pit	21,038	75.9	26,329	79.0
WC Linked to Sewer	1,393	5.0	423	1.3
WC not Linked to Sewer	2,683	9.7	4,699	14.1
Other	115	0.4	127	0.4
Total	27,759	100.0	33,317	100.0

TABLE 20 DISTRIBUTION OF PRIVATE HOUSEHOLDS IN ST ELIZABETH BY TYPE OF COOKING FUEL, 1982 AND 1991

Type of Fuel	1982		1991	
	No	%	No	%
Gas	3,407	12.2	7,022	20.0
Electric	130	0.5	99	0.3
Wood/Charcoal	22,078	79.5	25,838	73.4
Kerosene	2,023	7.3	2,125	6.0
Other/None	130	0.5	112	0.3
Total	27,768	100.00	35,196	100.0

The lifting of the kerosene subsidy in 1995 has undoubtedly increased the percentage of households using wood and charcoal. In an interesting example of local public- and environmentally-spirited initiative, a Santa Cruz business has offered to exchange wood and

charcoal stoves for gas stoves and gas cylinders for a modest price (Tony Freckleton, personal communication, June 1998). The Malvern Science Resource Centre promotes the use of solar ovens.

Issue 59 Additional efforts are needed to develop and promote alternative energy sources that are more affordable and sustainable, such as wind power, solar energy and, solar ovens

3.7.4 Social and Economic Environment

Employment and self-employment levels are relatively high in St Elizabeth. Unemployment rates ranged between 6.4% in January 1991 and 10.1% in October 1992 and were consistently among the lowest in the country (Statistical Yearbook, 1993). As indicated earlier in the chapter, the principal economic activities are agriculture, including small-scale vegetable production, sugar, and livestock rearing, mining, and river and marine fisheries. The parish is also a growing location for retirement and vacation homes for Jamaicans and foreigners as well as establishments catering to community and nature tourism.

According to the 1991 Census, the percentage of males who were working declined from 63% in 1970 to 68.4% in 1991, while for women the rate increased from 20% to 23% over the same period. While the percentage of those seeking work or wanting work and available declined over the period, it is significant that the percentage recorded as "economically inactive" doubled for males over the 21-year period. This change has accompanied an increase in unsustainable natural resource exploitation practices. Although, educational attainment has been increasing, opportunities for formal and vocational training are reported to be low. There are relatively few manufacturing and processing activities.

Issue 60 St Elizabeth has opportunities to increase the standard of living of its residents sustainably through development of value-added processing of agricultural products and other raw materials

3 7 5 Land Tenure

Major land holdings include Crown lands and lands of the Urban Development Corporation, the Petroleum Corporation of Jamaica, and Appleton and Holland Estates. The UDC has regulatory powers over its designated area. Corporate landowners act largely autonomously over their landholdings. Information is needed on the actual extent of these holdings, areas in small farms and lots, and the location and extent of illegal control of common/crown land by powerful business interests and the illegal capture of land by poor communities.

Issue 61 Unregulated private land ownership and illegal capture conflict with the objective of implementing a successful coordinated approach to environmentally sustainable land management. To promote immediate action, coordination is urgently needed among the NRCA, the Commissioner of Lands, the Town Planning Department and the Parish Council.

3 7 6 Resource User Communities

It is estimated that about 12,000 residents of the parish are in some way dependent on the Morass for their livelihood (see Table 11 in Section 3 6 1). Livelihood strategies, as described in Annex F, include various combinations of shrimping and fishing, small-scale farming, logging, wage labor, craftmaking and vending. Smallholder crops include sugar cane, bananas, rice, peanuts, dasheen and tobacco. Cattle raising is important and much of the Morass has been drained and cleared for pasture, as well as for cultivation of ganja. Additionally, several large enterprises (Holland Estate and Appleton Rum), a pimento processing factory, and river tour companies contribute both to the productive use and the degradation of the area.

Issue 62 The critical habitat values of the ecosystem are compromised as people depart from traditional sustainable practices and deplete the resources of the Morass in order to meet

income and subsistence needs. This is partly due to the declining fish and shrimp stock, loss of open channels for transportation, and flooding caused by the degraded state of the river and partly to the growing share of the population that is "economically inactive."

Outside the Morass, the principal type of informal resource use is sea fishing. There are nine designated fishing beaches in the parish: Great Bay, Calabash Bay, Frenchman's Bay, Fort Charles, Parottee, Galleon, Black River and Hodges. Treasure Beach and Alligator Pond are also fishing communities. Fishermen mainly fish on the banks since inshore fish stocks have traditionally not been plentiful. Fishermen at Treasure Beach have tried to supplement income by taking visitors on informal Black River tours, producing conflict with commercial tour operators.

3 7 7 Community Awareness and Mobilization

A survey of environmental awareness, attitudes and behavior carried out for the NRCA-DEMO Project in 1997 confirmed an observed level of environmental information that is generally low. A summary of the survey's findings may be found in Annex B. However, despite a lack of formal knowledge, the survey revealed that residents recognize the importance of the Morass and have a clear understanding of the principal causes of the degraded Black River water quality.

3 8 Infrastructure

3 8 1 Transportation

Roads The quality of south coast roads is variable. Many farmers on the Pedro Plains and elsewhere have difficulty getting their produce to market because of poor road quality or the lack of direct routes. The small size of the population limits the ability of communities to exercise political clout. Road quality has also limited visitor numbers at a number of attractions and beauty spots.

The Ministry of Local Government and Works has improved roads providing access to areas planned for tourism development. What has been described as a patchwork disintegration of land is going on because of the progress of road improvement and construction. While it becomes easier for farmers to get out their crops and more attractive to invest in tourism developments with better roads, greater accessibility encourages construction that is often not in conformance with the current Development Order.

Issue 63 Access v Protection *In order to protect the intimate quality of the countryside and the unspoiled quality of important ecological and cultural sites, should new road and road improvement proposals require EIAs? Exceptions could be made for cases in accordance with a recently-adopted updated land use plan prepared with broad public participation and a master EIA*

Of significant concern is the decayed and possibly dangerous state of some critical elements of infrastructure such as the Black River Bridge (noted by the Gleaner, June 7, 1998). Illegal construction of a bridge in 1997 was most likely a response to the real or perceived inattention to needed infrastructure.

Ports The traditional port of Black River handles larger fishing vessels as the only alternative to the fishing beaches that accommodate small craft. Discussion of the location of a port to export limestone has centered on Scott's Cove and Black River (see Issue 9). Black River has a siltation problem that makes it less than ideal for very large vessels. If physically feasible, the choice of Black River would be preferable, especially as Black River has existing infrastructure and needs activity to stimulate its economy.

A marina is needed on this part of the coast and would be another way to give life to Black River.

Construction of a cruise ship pier has been proposed at Luana. However, the proposal raises many significant issues raised below under tourism (Issue 67).

Airports Active airstrips exist at Holland Estate and Alpart and there are many abandoned airstrips in the Black River Upper Morass. Otherwise, the parish has no air connections. A South Coast aerodrome to provide air access to Kingston and Montego Bay has been proposed for some time, locations suggested including Mandeville and Luana. The latter raises issues similar to those discussed in Issue 63 and Issues 66 and 67 below.

Railroad Appleton Estate Tours repaired the rail line from Montego Bay to Appleton, refurbished cars and in 1987 leased an engine from the Jamaica Railway Corporation, launching a unique tourism attraction. With stops in Cambridge, Catadupa and Ipswich, the train "allowed hundreds of villagers to sell their craft, make clothing to be picked up [by passengers] on return" and provided local food and a visit to the Ipswich Caves (Judy Schoenbein, Mandeville Weekly, June 18, 1998). The train also added coaches for farmers and commuters along the line. With specially built visitor facilities for the distillery tour and rum tasting, the venture was successful, achieving 40,000 visitors per year by 1992. However, in that year, permission to operate was rescinded by the JRC.

A portion of rail line is leased to Alpart for the transportation of alumina from Nain to Port Kaiser.

Issue 64 Granting of a new lease to operate the line would have significant benefits for the parish in terms of developing its overall community, heritage and nature tourism opportunities as well as for residents in the northern part of the parish. In general, renovation and operation of the railways is needed to provide a sustainable and socially equitable alternative means of transportation.

3 8 2 Utilities

Water Supply/Delivery As discussed in Section 3 7 3, the parish is heavily reliant on rainfall catchment, 36% of households taking water from non-piped catchments in 1991. In normal times, this has been sustainable but in the current prolonged drought it has created a significant hardship. Decline in production of wells at Alligator Pond reached disastrous levels in July 1998. The introduction of piped water has begun to upset the former conservation life style, especially in the Pedro Plains. Complaints are made that some farmers are diverting treated water to their fields, reducing the supply available for legitimate domestic use and jeopardizing the effectiveness of traditional farming methods.

Drainage and Sewage Systems Some 805 of households had pit toilets in 1991 (Table 19). In many places, these facilities are environmentally sound. However, where dwellings are concentrated and where the watertable is high, they contaminate the groundwater and may also contribute to surface water pollution. Facilities such as the Black River Hospital and the Black River Police Station are regularly reported as significant sources of sewage pollution. The absence of public toilets at the fish market in Black River is another example of a public health hazard that could also become a tourism and public relations disaster. Public comment at the St Elizabeth Expo called for more public toilets, such as the ones Southern Parks & Markets has provided in Manchester.

Another concern is the need for better drainage. Santa Cruz is a community that experiences flash floods.

Solid Waste Informal solid waste dumps abound in the parish (see Chapter 4). Since the Black River dump is in the wetlands, people have the idea that dumping in the mangroves is acceptable.

Issue 65 New thinking is needed in planning to address the area's solid and liquid waste hazards to health and the environment. Sewers are costly (especially at rural densities) and

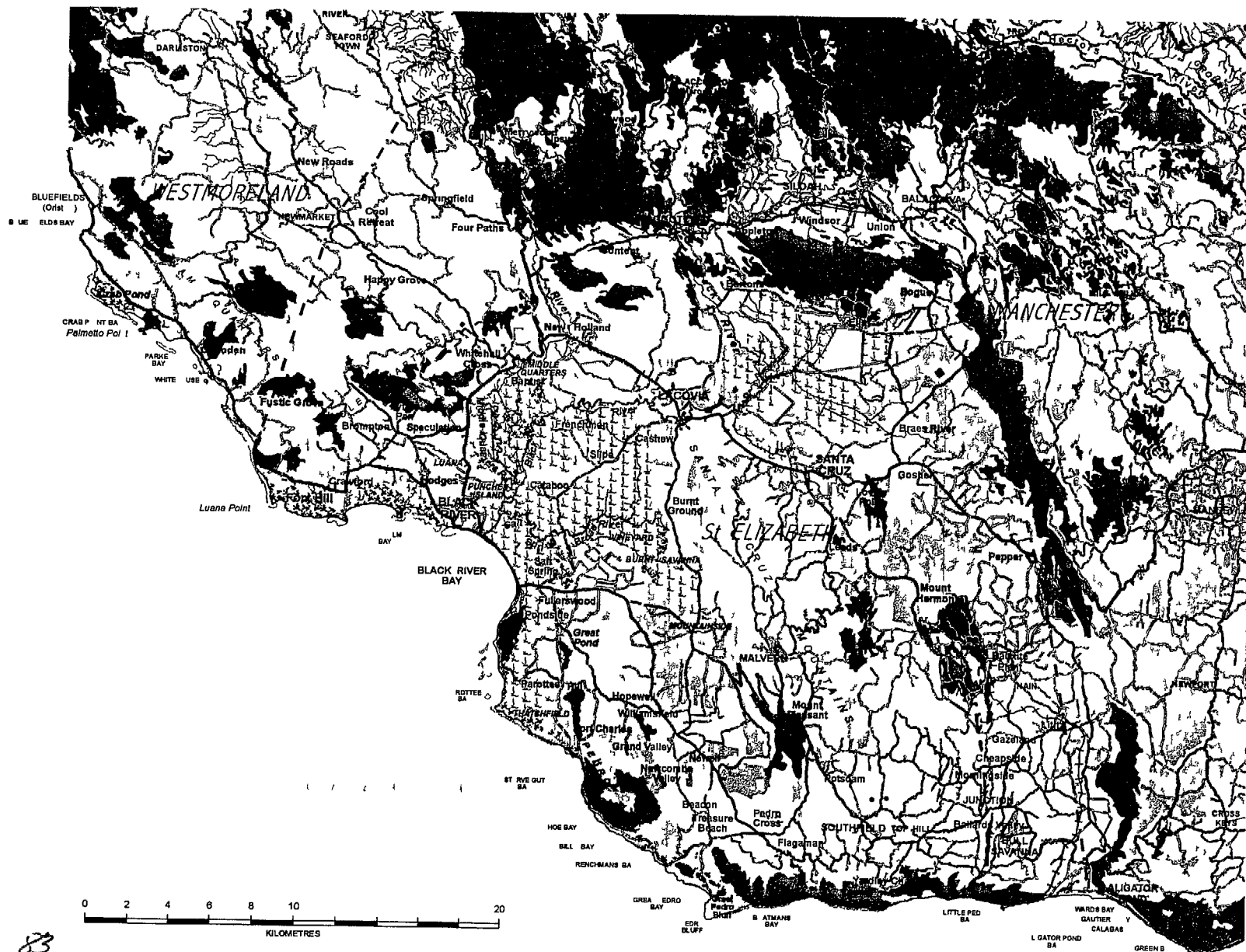
conventional treatment plants have a poor record of reliable operation in Jamaica. In urban areas, a focus is needed on small sewer systems and attractively designed, low technology ponds that use managed wetlands for nutrient stripping, offering high effectiveness at low construction and operating costs. Dry toilets and, in high watertable areas, composting toilets should be promoted in rural areas.

Power Although the town of Black River was the first town in Jamaica to be electrified at the turn of the century, the parish has been among the last to benefit from the rural electrification program. The program is now sufficiently active that residents are beginning to complain about the lack of attention being given to protecting trees, overall visual quality and views.

Issue 66 The UDC South West Coast Development Plan (1992) advised that "the development of infrastructure – roads, electricity, water, waste management & waste disposal – must be planned in conformity with the promotion of cottage industry due to the present socioeconomic situation. Opportunities to develop infrastructure in a synergistic way must be actively sought through coupling infrastructural upgrading projects with the development of other sectors. Infrastructural development must be rationalized in order to contain a tendency towards sprawling ribbon style development. This will lead to more cost-effective infrastructure installation whilst simultaneously reducing the negative impacts on the environment."

3 9 Land Use

Figure 14 shows land use according to the 1985 Geological Survey map. Significant changes in the Black River Upper Morass have been recorded on the map. However, the map needs to be updated from recent aerial photographs. (Existing air photographs date from 1992 and have not all been available to the authors.)



ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

Figure 14
Land Use

- LEGEND**
- Morass / Wetland
 - Mangrove
 - Parish Boundary
 - Road Class A
 - Road Class B
 - Road Class C
 - Other Roads
 - Railway
 - Seasonal Gullies & Drainage Features
 - Small Rivers & Streams
 - Large Rivers
 - Ponds
 - Coral Reef
 - Quarry
 - Pasture
 - Banana
 - SugarCane
 - Mixed Agriculture
 - Trees & Scrub
 - Woodland / Forest

Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services Inc. Technical Assistance Contractor to the G.O.J. - USAID Development of Environmental Management Organizations (DEMO) Project July 1998



3 9 1 Agriculture

The agriculture of St Elizabeth includes dry farming on the Pedro Plains, irrigated agriculture, tree crop plantations, sugar estates, livestock rearing and small-scale, often slash and burn, farming. Unfortunately, the latest Census of Agriculture was taken in 1978/79. It placed St Elizabeth first in hectares in agriculture, third in the number of farms after Clarendon and St Catherine and second to Manchester in production of domestic crops.

The parish contains very limited areas in soil capability classes I and II (Figure 10). Despite this, the parish has achieved high levels of production on its Class II and Class III soils through techniques designed to protect their fertility and prevent erosion.

Improvement of pasture is feasible through soil improvement using more appropriate types of grass (such as Africa Star), alongside sprinkler irrigation. High potential agricultural systems exist for forestry and agro-forestry. Market gardening and horticulture could be encouraged. However, the greatest potential for growth lies in various forms of processing to prevent wastage of produce, now estimated at 60%, and to add value (Tony Freckleton, personal communication).

3 9 2 Fishing (see also Sections 3 6 2 6 and 3 7 5)

3 9 3 Mining and Industry

Bauxite from the Manchester plateau is processed at Nain and the alumina is exported from Port Kaiser. In contrast to the mining of raw bauxite that feeds exports from the North Coast, the processing of alumina provides a much higher level of employment. However, that employment brings a cost in terms of dust, groundwater pollution and potential disaster (red mud lake failure). Deposits in the Essex Valley, upon which the plant originally depended, have been mined out.

Large-scale mining operations include limestone mining at Brompton and silica sand mining, by West Indies Glass Industries, at Hodges. The U.S. demand for limestone generated an increase in production island-wide between 1991 and 1992 of 3.2 to 10.4 million cubic meters. Sand mining of beaches has long been a very serious problem and has contributed to beach erosion. Large-scale exploitation of mineral resources should be subject to an Environmental Impact Assessment and a Cost-Benefit Analysis. Sand mining of beaches is becoming a very serious problem.

3 9 4 Commerce

The principal center of trade and services for the parish is now Santa Cruz. Important district centers include Southfield, Junction, Black River and Newmarket. The supremacy achieved by Santa Cruz has become a concern to residents of Black River. However, it has given the parish capital a significant opportunity for a different of commercial prosperity if that opportunity is seized soon.

3 9 5 Tourism

The number of hotel beds in Mandeville, Manchester, and on the South Coast rose from 188 in 1986 to 351 in 1992. Over the period, beds in resort cottages rose from none to 510 and in houses from 4 to 416. (Current estimates are needed.) To decide by community choice, the South Coast has focused on small community and nature tourism. The Black River tours, Lov Leap, YS Falls, Magotty Falls, Apple Valley, Treasure Beach and Pedro Bluff are among the first attractions in an emerging industry that has great potential for sustainable expansion. The potential network of destinations could be a cost-effective alternative tourism model for Jamaica.

For many years a plan has been in place for a major hotel at Whitehouse in Westmoreland. The proposed 350-room hotel is to cover 30 acres of the 286-acre site. If approved, the proposed hotel will bring the all-inclusive model developed on the North Coast to

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the South Coast for the first time. The possibility of a cruise ship terminal will encourage additional intensive tourism development and the associated patterns seen in Ocho Rios and Montego Bay.

Issue 67 The Environmental Impact Report for this proposed hotel was recently released and needs to receive widespread and critical review. South Coast residents at the June 18 presentation expressed concerns about how the community can protect the environment and unique culture of the area and ensure that other hotels will not follow the proposed project, repeating the destruction of the original lifestyle and environment of Negril.

3 10 Cultural and Historical Heritage

As suggested in Section 2.1 and Box 6 below, St Elizabeth has a rich history that deserves greater attention.

3 10 1 Taino Sites

The south coast of St Elizabeth contains a rich series of Taino sites, including settlements, burial grounds and middens. Few have been excavated and one significant site was recently destroyed.

BOX 6 ELEMENTS OF ST ELIZABETH'S CULTURAL HISTORY

Amerindians The coasts of western Jamaica were first settled in the earliest phase of Amerindian settlement between 600-900 A.D. There are many sites along the coastline, on coastal hills and along the rivers, the largest of which may be beside the Great Pedro Ponds and at Alligator Pond.

Spanish The Spanish attempted to construct a fort at Parottee in about 1508 (construction of Sevilla la Nueva began in 1509). The Spanish abandoned Parottee in about 1519. It is not known whether the Spaniards had a settlement at the mouth of El Caovano, as they called Black River, but Lacovia was their regional capital, founded in the 1530s as a community of secret Sephardic Jews fleeing the Spanish Inquisition. It appears to have been a thriving town because it was a center of resistance to the English. It is said that in 1655 Diego Pimiento, a black Spanish soldier, single-handedly protected the strategically important fording at Lacovia from the English.

English The English also adopted Lacovia as their regional capital. In 1774 Lacovia was a predominantly Jewish town, consisting of 12-14 houses, a courthouse and two taverns. Then as now there was rivalry between the interior towns (Lacovia and later Santa Cruz) and Black River. Lacovia is the site of the tomb of a member of the Spencer family of Althrop, who reputedly died in a duel in 1738 and was buried next to his opponent.

The town of Black River is first mentioned in the records in early 18th century. The river formed a lifeline, to which properties were connected via the barquadiers (small wharves). Among the commodities that were exported via Black River were sugar, rum, annatto, lumber and eventually logwood. Black River Bay was notoriously shallow so lighters had to be used to take the goods to vessels anchored in the channel.

It was the successful introduction of logwood (used in the production of haematoxylin, a blue-black dye) in 1715 that brought booming prosperity to Black River in the middle and late 19th century. The ornate Victorian houses, courthouse and seawall walk date from Black River's brief period of prosperity, which also brought the first municipal electric lighting plant (fueled by wood), the first car and one of the earliest telephone systems. In the early 20th century synthetic dyes were available, and the logwood industry fell into a decline.

While the major towns went through phases of expansion and contraction, the economy of the hinterland was more stable, based on fishing on the coasts, small farming and livestock on the plains, and sugar in the wet interior valleys such as Appleton and Holland.

Track and trail systems of the Taino eventually became Spanish bridle paths across savannas where ancient cotton trees marked the way. The old Spanish road from Rio Bueno via Lacovia to Pedro in St Elizabeth may no longer be detectable.

Issue 68 *How can sites of archaeological value be protected for scientific research and public enjoyment and education?*

3.10.2 Black River

Black River is an important heritage site with potential for development as an historic town (see Table 21). From the time of the Spanish, Black River was an important shipping port. During the Spanish period, mahogany and "chocolate" (cocoa) were the mainstays. Later it became a cosmopolitan town and some very fine architectural examples are still to be found. The structures lining the main street create a place of great character and visual appeal.

These structures could be restored or rebuilt. Logwood dye became a most important export product and brought prosperity reflected in the fact that the town was the first in Jamaica to be electrified. In addition to the down town structures, other aspects of Black River's potential attraction, the mineral springs of the Black River Spa, the waterfront and the riverfront all need attention and improvement.

Issue 69 *Some of the buildings in Black River are severely degraded while others have been inappropriately renovated. Timely action is needed as recent building/development practice has altered the townscape. It is a commonly held view that the town needs to grow and become modernized. However, by doing so residents will forego an opportunity to develop an important heritage tourism site. Pioneers are needed to demonstrate to other landowners, business people and residents of Black River the value of the town's layout and historic structures.*

TABLE 21 HERITAGE SITES

RESOURCE	STATUS	PRESENT ACTIONS	NECESSARY ACTIONS	REGULATIONS
Black River Town more than 50 historic structures, excellent examples of civic design	Being degraded by unsympathetic development	Some buildings have been listed	Plan for redevelopment of Black River as a heritage town. Education and incentives for compliance.	Conservation of structures, routing of power lines, use of signs, tree preservation.
Archaeological sites	Many still undocumented. Even documented sites are being bulldozed before any research has been done.	None	Sites should be listed. Archaeological research should be encouraged at major sites.	Regulations should ensure that sites are documented and studied before development occurs. Should include large fines for destruction of sites.
Historic buildings	Some still in use, others abandoned. Many still undocumented.	None	Parish inventory should be developed. Incentives should be identified to maintain use or encourage sympathetic redevelopment for tourism.	Regulations for incentives.
Historic landscapes and ways of life	Dryland farming at risk from changes in agricultural sector.	None	New ways to make farming more competitive need to be found.	

3 10 3 Landscapes and Vistas

It will be evident from the foregoing description that while St Elizabeth is fortunate in having much old growth and relatively undisturbed areas, much of its area has been altered by a succession of settlers. It is important to recognize the importance of man-altered or managed landscapes. Just because an area is not "pristine" does not mean that it is not a candidate for protection or treatment with extreme care. The UDC (1992) recognized, for example, that "the agricultural savannas of southern St Elizabeth, the cane fields and the coastal plains are all examples of Jamaica's rich natural legacy. In these habitats flourish untold riches of biodiversity."

Like historical buildings and sites, the natural environment often requires interpretation and restoration in order to make it attractive and accessible to visitors. A system of national parks and protected areas is necessary to ensure that the best and most typical of Jamaica's natural assets are retained for the enjoyment, appreciation and economic welfare of present and future generations. Economic activities, however, must be the engine that maintains the vitality of most humanized landscapes.

Many of the most important and interesting historical sites and buildings are closely associated with areas that are of ecological importance. Conservation of historic and environmental sites should be considered together, not in isolation, requiring a partnership between the NRCA and the Jamaica National Heritage Trust is important. When historical sites can be conserved in the context of existing and historical landscapes the overall interest to Jamaicans and to visitors will be greatly enhanced. It is important to determine the carrying capacity of natural resources and to monitor them in order to avoid either desecration or over-exploitation.

4 THREATS TO THE ENVIRONMENT, OPPORTUNITIES AND RECOMMENDED ACTIONS

4.1 Threats to the Environment by Major Activity

The many issues identified in the previous two chapters suggest that the environment of St Elizabeth is in trouble. In fact, many things are being done well and others could achieve sustainability with more knowledge and cooperation. Despite numerous assaults, natural systems are showing surprising resilience at present. The principal current sources of degradation can be addressed with technology and planning. Of greater concern for the future is the potential for expansion of certain trends and practices, together with the introduction of new types of development, to alter the existing balance in fundamental and irreversible ways. Readers are invited to comment on threats and recommendations at the end of this chapter.

4.1.1 Industrial Activities

Bauxite Mining Existing Impacts Figures 15 and 16 suggest that a substantial part of eastern St Elizabeth is affected by dust and air pollution from Alpart's alumina processing plant at Nain and by caustic soda pollution of ground and surface water from the red mud lake. The plant is one of the two largest contributors to degradation of the environment and deterioration of environmental health. The red mud lake at Nain lies within a zone traversed by faults and failure could have devastating effects on the quality of groundwater.

Potential Threats Bauxite reserves exist throughout much of the parish, as indicated on the Development Order (Figure 3). Deposits in the Essex Valley have been mined out and the Alpart plant is supplied from the Mandeville Plateau. A little mining took place at Magotty before abandonment of the Revere plant. However, exploration and mining could begin anywhere on Crown lands, including the Cockpit Country. Mining and conservation of the wet limestone forests and water resources of the Cockpit Country and surrounding karst limestone cannot be compatible. There are no

mitigation measures that could maintain or restore the ecological integrity of watershed functions during or after mining. In addition, increased deforestation and mining would reduce rainfall and hence the amount of groundwater entering the Black River system, while increasing the frequency of flash floods and reducing the quality of the water. Mining could also occur on Jamaica Bauxite Institute land in the Santa Cruz Mountains, threatening the dry limestone forest. Residents of the Malvern Hills area have expressed unanimous opposition to mining.

Limestone Mining/Quarrying Limestone mining and quarrying represent similar conflicts with watershed and aesthetic values to those described above although on a greatly reduced scale.

Recommendations

- 1 The Government's recently announced initiative to address the social impacts of bauxite mining needs to be expanded with a comprehensive study of the relative suitability of bauxite reserves (especially on Crown and JBI lands) for mining, considering other competing resources and values.
- 2 Changes in the Mines and Quarries Act that have reduced NRCA's role in the approval process for mines and quarries should be reversed.
- 3 The approval process should require assessment of the loss of options as a result of mining.
- 4 Parish plans, including the updated Development Order, should identify areas suitable for mining, areas suitable for tourism but not for mining, and areas where very careful planning could reveal compatibility.
- 5 Decisions to undertake mining should have local input and full public review of costs and benefits.
- 6 The JBI should be encouraged to seek sustainable alternative uses for its lands in anticipation of declining activity in the industry.

Rum Distillery Dunder and other Wastes The Appleton distillery is the other major pollutant of the parish environment. The pollution of the Black River system by dunder (sugar cane processing waste) continues to be the greatest preoccupation of the communities that rely on the resources of the Morass, greater even than the lack of lighting, telephone service and good roads. Dunder releases are estimated at 11.4 million liters of dunder per month and are thought to account for some 40 to 50 percent of nutrients in the river, feeding the growth of water hyacinth. Dunder decreases the biological oxygen content of the water, resulting in the suffocation of aquatic life (see Section 3.5.1.4). The concentration of dunder in the river water is greatest in the January-February period when the watertable is low. In addition to dunder, it is reported that the Appleton plant also disposes of other wastes, including diesel oil and sulfuric acid. This may explain fishermen's complaints about skin rashes. Cane washing is a further source of water pollution.

In 1995, Appleton promised reduction through use of dunder for energy generation. That proposal did not materialize. In 1997, Appleton claimed that it had purchased biodigester equipment. That claim has not become a reality. By now, it must be clear to Appleton that the economic, social and environmental costs associated with the plant's operation are broadly unacceptable and could be used to discredit Jamaica's rum industry.

Recommendations

- 1 Formulate a cooperative agreement between the NRCA, the people of St Elizabeth (represented by the Parish Council or a body designated by it and the NRCA) and Appleton setting a legal framework for elimination of the problem or reduction to the minimal acceptable level.
- 2 Encourage Appleton to use the clean-up action in its marketing.
- 3 Possible uses of dunder, for example in making of perfumes and other chemical products, need to be researched.
- 4 Discharges of other types of polluting effluents and wastes need to be halted.

4.1.2 Commercial Activities

Signs Signs of all kinds, including advertisements for commercial businesses, are proliferating throughout the southern part of the parish. The trend and the attendant visual blight are causing environmentally minded residents concern. Many, if not a majority, of the signs are erected without Parish Council permission. However, action is not being taken to remove them.

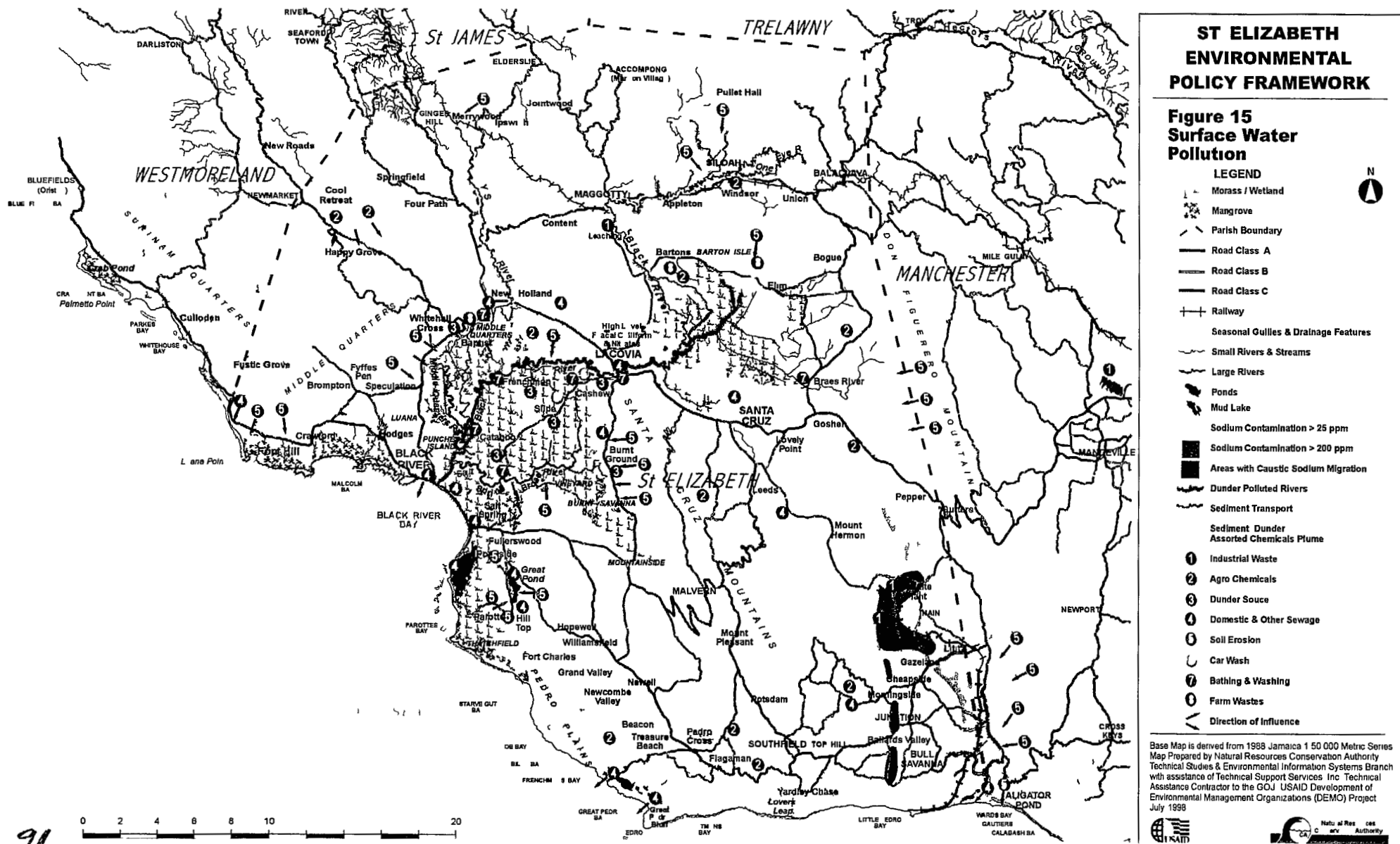
Recommendations

- 1 Require all signs to receive Parish Council permission.
- 2 Require all signs to display their approval code number (in small print at the base of the message).
- 3 Empower citizens to remove any new sign not displaying the required permit identification or displaying a permit identification that is not verified by the Parish Council.

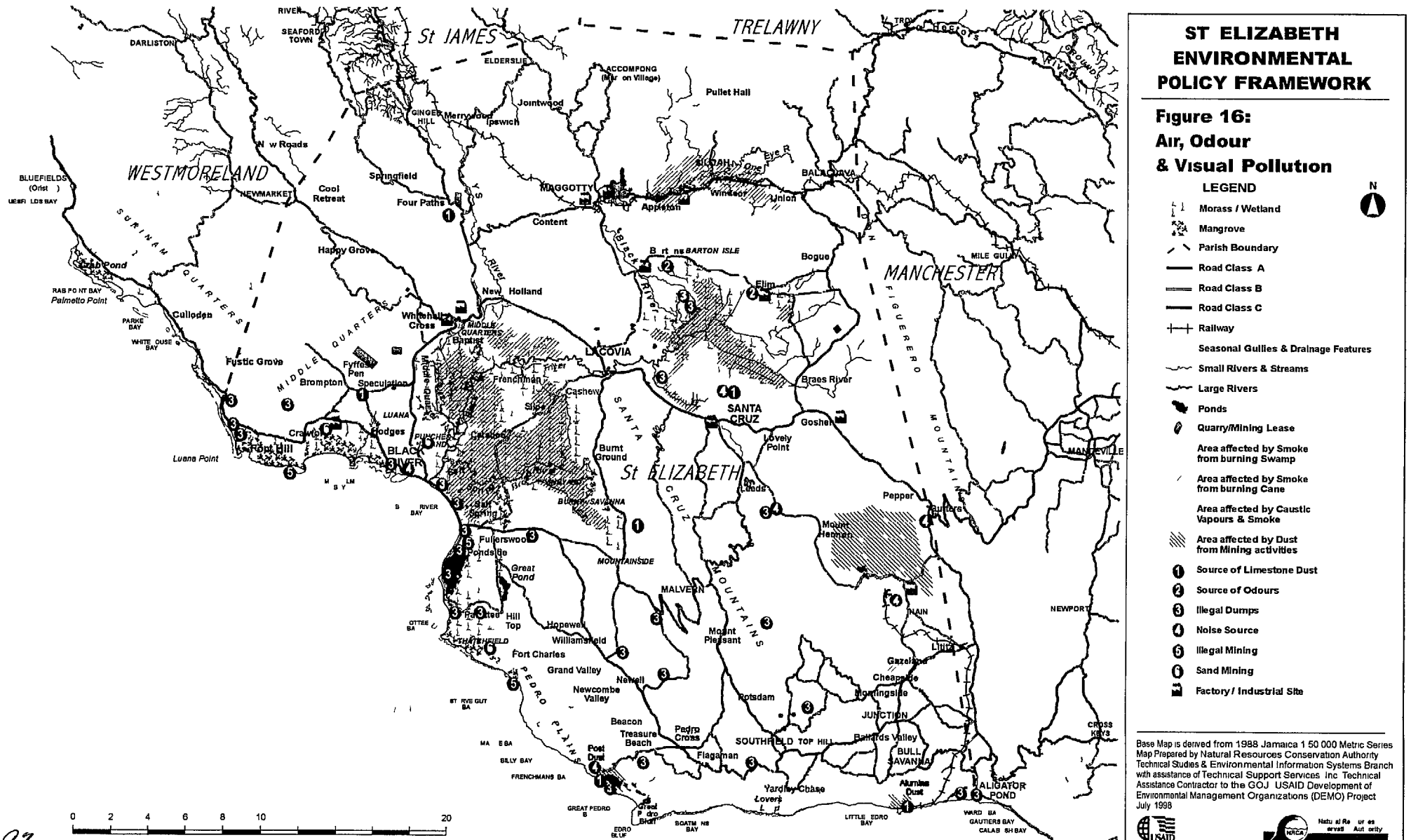
Zoning Incompatible adjacent activities (e.g. garages, bars or dance halls next to houses, villas and restaurants) cause disturbance, loss of business, visual pollution and loss of property values.

Recommendations

- 1 Licenses should not be issued for bars in residential areas if the residents object. (This is already covered under the regulations but is not well enforced).
- 2 Garages should be licensed and should be subject to zoning.
- 3 Villages and resorts should be zoned for commercial activities (following consultation with the communities) and zones publicized and enforced.
- 4 Existing businesses should be educated about visual pollution. They should be made aware of the impacts of, for example, repairing vehicles on streets, or abandoning cars on verges. Regulations should be drafted making businesses responsible for the cost of removal. (This would also reduce the availability of materials for blocking roads).



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- 5 The benefits of using trees and hedges for screens should be promoted. A list of suitable plants should be distributed. The South Coast Resort Board's bougainvillea hedge on the roads near Junction and Southfield shows how effective such a policy could be.

Obstruction of Views and Vistas In many places, structures such as houses, shops and shacks are constructed so that they obscure an outstanding view or vista.

Recommendations

- 1 Outstanding viewpoints should be considered part of the national heritage and construction should not be allowed to obscure views.
- 2 In approving construction of shops and other structures the Parish Council should consider how the proposed placement fits into the surroundings and complements or impairs views and the appearance of a community.

Obstruction of Roads Throughout the parish permanent and temporary structures are being constructed close to roads and along road edges where there is no place for parking. They obstruct the traffic and limit the options for widening roads. Illegal structures are often left undisturbed on the road right of way.

Recommendations

- 1 Road reservations should be sufficient for a two-lane road and houses should be set back to allow for widening if necessary.
- 2 Illegal shacks should be removed promptly from roadsides.

4.1.3 Agricultural and Related Activities

Improper Agricultural Practices (Erosion/sedimentation and overuse of chemicals) Upper Morass agriculture has severely affected the Lower Morass. Since the river has been dyked, it has been less able to shed its silt load over the Upper Morass before passing through Lacovia Gorge to enter the lower areas. The lower

Morass is now influenced by this silt and high levels of agro-chemical pollutants washed into the river from above Lacovia.

Large areas of the Upper Morass are reverting to wetland following the failure of the large-scale drainage and agriculture experiment. Currently rice production is virtually non-existent and has been replaced by sugar cane production. However, consideration was recently given to a similar proposal for the Lower Morass (Fred Campbell, NRCA, personal communication, 1997). It is also said that cane farmers are grabbing land (thousands of acres) in the Upper Morass.

Recommendations

- 1 An ecological assessment and land use plan are urgently required for the Upper Morass. A survey of existing ownership and agricultural use should be undertaken immediately and the plan should identify compatible levels and types of agriculture and areas to be encouraged to regenerate as wetlands.
- 2 In recognition of the high value of the Upper Morass for wildlife and its potential to attract ecotourism, any reactivation of drainage plans should only be considered in the context of 1 above.
- 3 Wardens are needed to patrol the Upper and Lower Morasses to ensure that no more big squatters get established.
- 4 Continuing education on the use and misuse of agricultural chemicals needs to address environmental impacts.
- 5 Discharges of waste into the Morass from pimento processing. And similar plants need to be monitored and prevented.

Aquaculture Fish farming at Elim is said to contribute pollutants to the Black River system.

Recommendations

- 1 Refer the matter to the NRCA and encourage Elim and any other polluting aquaculture operations to adopt sound practices.

Operating ponds on a rotation basis, with a four-month fallow will allow wastes to decompose safely on site (Floyd Homer, personal communication, 11 97)

- 2 Care is needed to avoid accidental releases and introduction of exotic fish and shrimp species from fish farms to the morass

Slash and Burn Farming Slash and burn land clearing, leaving land completely bare of vegetation prior to planting, and burning of wetland vegetation are well-established agricultural practices in the Jamaica As a result many forests have been converted to shrub and their value for timber and watershed protection greatly reduced The situation in St Elizabeth is not as bad as in some other areas The parish is fortunate that much old growth forest remains intact However, there is no cause for complacency

Aerial photographs reveal that cleared patches scar many valley bottoms and south facing hillsides Natural regeneration of such areas is impeded by invasive exotic species including grasses and ferns While these patches are usually small, the effects of invasive species, erosion and visual impairment could be cumulatively significant, especially in an area aiming to attract nature tourism

Farmers cut and burn marsh grasses to encourage fresh growth and to provide space and mulch for certain cash crops such as dasheen and tobacco Non-natural fires threaten forest

Recommendations

- 1 Multi-agency work is needed to formulate a system of incentives for maintaining forests
- 2 Settlers in sensitive areas must be relocated, with enforcement to prevent resettlement
- 3 A suitable combination of practices needs to be identified and publicized in a major program of public education and awareness involving the NRCA, RADA, the Parish Council and environmental organizations
- 4 Slash and burn practices then need to be prohibited by law or

regulation in selected areas of high biodiversity, including all Forest Reserves

- 5 The NRCA should request the Jamaica Defense Force to work with it on a regular cooperative program of surveillance and communicate findings to wardens and forest rangers so that those who break the law can be apprehended

Undesirable Grazing Practices Cattle are allowed to graze in the morass where they eat young mangroves and other trees, inhibiting forest regeneration It is reported that cattle farmers have drained and filled areas of morass and cut down trees to create grazing land Substitution of forest with grass increases the risk of fire, which also reduces the probability of forest regeneration

Ganja is cultivated in areas of swamp screened by mangroves and swamp forest It is not a particular threat to the Morass However, any further cutting of swamp forest or forested hillsides to provide extra concealment cultivation would be a significant threat

Creation of pasture, in addition to sand mining, has disturbed the silica sands in the Hodges and the plains of the area south of Thatchfield and west of the morass Much of their characteristic vegetation has probably been lost The dunes of Thatchfield are dominated by introduced species (e.g. guango, limes and logwood), with scattered indigenous trees such as sweetsop and *lignum vitae* Because of changing tastes and cheap imports, cattle rearing is becoming unprofitable and alternatives should be sought and encouraged

Recommendations

- 1 Grazing should be prohibited in the Black River Lower Morass
- 2 The NRCA should work with the Rural Physical Planning Unit (RPPU) and others to determine of areas that are suitable for grazing, together with steps that can be taken to improve pasture, and areas where grazing will not be permitted
- 3 The NRCA should advise the Town Planning Department of its findings for incorporation in the updated Development Order

Threats to Sustainable Agriculture On the Pedro Plains, the current drought is threatening the survival of traditional dry farming techniques. There are complaints that some farmers are diverting domestic water supply to fields and calls for an irrigation project are again being heard. However, inappropriate practices exacerbate the effects of the drought. In particular, farmers are cutting trees on their land. This can be almost as devastating as on the hills, lowering the water table, increasing the risk and severity of fires, contributing to the drying out of land on the edge of swamps and, indirectly, encouraging squatting and construction on unsuitable land.

Although dry farming is an effective response to the dry, rain-shadow conditions of south St. Elizabeth, the prolonged dry period has brought suffering. However, the risks of irrigation need to be considered before a scheme is designed and implemented. Unless existing methods of mulching were combined with irrigation and very small measured quantities of water were used, the erodible soils would be less protected. Production costs would be increased, encouraging some farmers to depart from the traditional rotation and fertility would tend to decline, with a consequent increase in the use of artificial fertilizers. Irrigation would impact the water source, most likely the Black River, and accelerate saltwater intrusion.

Recommendations

- 1 Alternatives for increasing the profitability of St. Elizabeth's important agricultural industry need to be examined and tried.
- 2 The Government can assist by
 - a discouraging importation of produce that competes with St. Elizabeth produce,
 - b improving farm roads
 - c helping with incentives for young people to enter and remain in farming
- 3 Other agencies can help by providing incentives for installing rainwater catchment tanks and providing instruction in the use of greywater.
- 4 RADA, the Scientific Research Council (SRC) and/or UWI could

undertake research into varieties best suited to the drought and soil conditions of South St. Elizabeth, support identification and use of native trees, and support research into ways to use and add value to the 60% of agricultural produce that is estimated to go to waste (Freckleton, personal communication) (see Chapter 5 for further discussion).

- 5 Local organizations can educate farmers not to cut trees and provide incentives not to do so. (See tree planting below.)
- 6 A two-day meeting of MPs and the Prime Minister's Advisor on Technology was held in St. Elizabeth on March 15, 1998 to consider agricultural issues. It has been suggested locally that a further session is needed to consider the interactions of agriculture and the environment in St. Elizabeth.

Timber Harvesting/Deforestation In response to the substantial demand for forest products (lumber for construction and furniture, firewood, charcoal, yam sticks, etc.), timber continues to be harvested, often without permission. Deforestation in the morass and environs, including a large part of Cockpit Country, is affecting the amount of water entering the system and reducing biodiversity. Public opinion is beginning to be aroused on the issue. Participants in the St. Elizabeth Expo Tuesday Forum (June 9, 1997) made statements about business people benefitting from reaping millions of dollars' worth of lumber.

In the Morass, royal palms, white and red mangroves, logwood, mahoe, and other species are being systematically and regularly logged by a few individuals. In the mountains, extraction usually involves cutting the tree at waist height, taking approximately 6 feet of the trunk and abandoning the rest – rolling logs downhill, damaging other trees and creating gully courses which then erode and block roads with washed out stones and rubble.

- 1 An active partnership between the NRCA and the Forest Department is needed to
 - a Ensure sustainable management by the Forest Department of Forest Reserves within the system of Protected Areas,

- b Determine other forested public lands that should be included in the system of protected areas,
 - c Prepare sustainable management plans for specific areas, including the identification of subsistence and small commercial forestry operations that can meet local demands for forest products,
 - d Identify potential for community management of forest resources on public or private lands,
 - e Quantify demand and supply for the different forest products,
 - f Identify and promote options with the potential to meet the demands for charcoal¹ Identify and promote options with the potential to meet the demands for yam sticks and fishpots²
- 2 The NRCA's proposed field office should
 - a Encourage the public to report those who conduct illegal logging operations,
 - b Ensure the effective prosecution of offenders,
 - 3 Encourage a collaborative program of tree planting, changing habits, attitudes and values and encourage recognition of the multiple values of caring for trees (See Chapter 5 for further discussion)
 - 4 Continue to enforce licensing of sawmills, introduce licensing of chainsaws and ban mobile sawmills

Unsustainable Fishing Practices Morass fishermen burn the sedge grasses of the morass periodically for easier passage to waterways and to facilitate the placement of various trapping devices Burning threatens crops, thatch palm and other trees As pollution and clogging of channels has reduced the fish and shrimp population, young fishermen have begun to abandon traditional sustainable practices, taking shrimp during the breeding season, for example

¹ E g expansion of the private initiative of Vere Agencies, May Pen, which sells a gas stove and a cylinder of gas for J\$1600 in return for a coal stove, reinstitution of the kerosene subsidy

² E g plantations of fast growing trees, recognizing that the mini-sett yam program has not caught on broadly with farmers and that no acceptable alternatives to wood exist for fishpots

There have also been reports of illegal fish traps in channels that affect the natural flow of water in the rivers It is also alleged that overfishing and premature removal of stocks by sea fishermen are increasing The use of seine nets in turtle grass beds, small-meshed nets, fish guns, dynamiting and fish pots continues unchecked

Recommendations

- 1 Seek the assistance of the Fisheries Division of the Ministry of Agriculture with establishment of fishing cooperatives and programs education and community self regulation
- 2 Formalize traditional measures for ensuring sustainability, including a closed season for shrimp

4 1 4 Tourism

Existing Community Tourism The tourism product desired for the South Coast is small-scale nature-based and community-based tourism

Treasure Beach has demonstrated that all elements of a community can benefit sustainably from domestic and international tourism with limited investment and minimal change to the environment However, over the past five years there has been increasing immigration of outsiders intent on profiting from the presence of tourists The community is attempting to manage the situation on its own In part because of GOJ concerns about visitor security, the ability of individual property owners to profit from the demand for bed and breakfast or occasional villa rental is being curtailed by increasingly strict standards and regulations These standards tend to favor professional hoteliers and will limit the growth of a type of sustainable tourism whose characteristics and benefits have not yet been understood at the national level

Recommendations

- 1 Encourage replication of the Treasure Beach model and the creation of a network of linked attractions and routes for scenic

and recreational driving, walking, biking and /or riding throughout St Elizabeth. Making the entire parish a destination could spread out visitors and minimize the perception that certain destinations are targets for opportunists and harassers.

- 2 Encourage TPDCo to establish an accommodation category below that of villa, advertised as at the visitor's own risk, that would eliminate the provision of professional security service and other requirements now applied to villa owners.
- 3 Through the South Coast Resort Board, encourage the Jamaica Tourist Board to include the marketing of villas, bed and breakfasts, etc. with its "Meet the People" program.
- 4 Alternatively, establish a local marketing entity to promote and arrange reservations on behalf of all in St Elizabeth who would like to participate in the program.

Alternative Tourism The Old Wharf Hotel, Treasure Beach (Tranquillity Bay) and two similar facilities at Alligator Pond are further examples of how foreign exchange can be earned with minimal external impacts. However, these facilities, because of their size, should not be exempt from hotel health and sanitation standards.

Recommendations New regulations may be required to address long-stay alternative (health, education, sports) tourism facilities.

Ecotourism -- Tours and Attractions Certain ecotourism activities are creating negative impacts on the very natural resource base on which the product depends. The promotion of the concept nature tourism and community-based tourism has highlighted the need for greater control of tourism-related activities in order to ensure sustainability of the product. The problems related to tour operations on the Black River highlight this. Lack of licensing requirements in the past allowed activities to be undertaken with little or no public and official scrutiny or regulation. As a result, inappropriate construction has taken place on Font Hill Beach, a beach that needed to be left as nearly as possible in its natural state (Hendry, 1988) as part of a proposed protected area. It has also resulted in competing provision of the same product has degraded the Black River visitor

experience and adverse effects on the vegetation and wildlife of the Morass. In addition, excavation of the morass and cutting of canals was undertaken for an unlicensed rafting operation near Lacovia.

Recommendations

- 1 Ensure that all tourism proposals are fully reviewed by the NRCA and other affected interests, including the South Coast Resort Board, Parish Council, SEEPa.
- 2 Develop greater collaboration between NRCA and TPDCo in the formulation and monitoring of environmental standards.

Use of the Black River System by Tour Boats, Jet-skis and Rafts

The banks of the Black River, Salt Spring River and other Morass waterways are being eroded by boat wakes, exacerbated by boat tour operators traveling at excessive speed. The frequency of boat tours on the Black and Broad Rivers is also responsible for noise and visual pollution and for water and air pollution from oil discharges and poorly maintained engines. Jet skis, now a common tourist feature at hotels east of Black River town, cause similar problems and can be dangerous to human and marine life.

TPDCo carried out a Black River carrying capacity study in 1997. The study was a step in the right direction but did not adequately address issues such as the environmental effects that have caused the absence of birds on Broad River. Birds are good indicators of environmental quality and their absence could be due to changes in the food chain or nesting and roosting habitat as well as disturbance. The study advised that the capacity of Black River boat tours was not to be increased beyond the present level. The study also recommended purchase of a patrol boat and installation of a warden. The boat has been purchased through TPDCo and the South Coast Resort Board and the NRCA has recruited a warden.

The carrying capacity study briefly addressed the existing rafting operation but did not consider the cumulative effects of any possible replication.

Recommendations

- 1 Expand the Black River Carrying Capacity Study to include assessment of fish and shrimp and a more complete assessment of birds, comparing existing conditions with baseline studies prepared in the 1980s
 - 2 Under the NRCA's Permit and Licence System, environmental impact assessments are required for new ecotourism activities. It will be important to provide the broadest possible perspective in these studies, using them to assist the applicant with placing the tour or attraction within the growing network of activities. One example of a facility requiring an EIA is the bird pond recommended in the Carrying Capacity Study
 - 3 EIAs should also assist with assessment of the carrying capacity of the feature or system that is to be the focus of the tour or attraction and with assessment of whether additional similar activities are sustainable
 - 4 Undertake an expanded program of continuing monitoring (beyond what is recommended in the Carrying Capacity Study) to review the study's recommendations so that further modifications of the tour practices can be introduced as necessary
 - 5 Phase out the existing boat stock and replace with electric-powered barges (preferably solar-recharged)
 - 6 Alternatives to the high-intensity tours are needed, including slow-speed birdwatching tours
 - 7 Heavy penalties are needed for taking boats close to nests, mistreating wildlife, including crocodiles, etc
 - 8 Expert advice should be sought regarding the advisability of feeding crocodiles
 - 9 Additional attention needs to be given to the entire issue of rafting and the associated damage from dredging and cutting channels. Licensing requirements should be drafted to ensure minimum physical change and visual intrusion
 - 10 Boat operations are not contributing anything to help to control other activities that are affecting the quality of wetland ecosystems (e.g. illegal hunting and fishing, illegal cultivation, grazing and extraction of timber)
 - 11 Seek funding for a more extensive study to
 - assess the extent of ecological and socio-economic effects of associated developments (e.g., increased number of tourists in Black River, expansion of hotel and villa rooms),
 - assess the carrying capacity of the river system under existing and alternative patterns of use,
 - carry out "willingness to pay" survey to determine economic value as well as what people will contribute towards protection of natural resources
 - develop strategies to achieve sustainability (guidelines for boat operations, financial and legal strategies, willingness to pay for protected areas development, improved planning, design, enforcement and public education, and consensus-building for environmental planning in Black River, etc),
 - determine trends in resource use on the river and wetlands,
 - assess how any changes are affecting the quality of the experience of visiting the area
 - 12 Promote the registration/licensing of attractions and the training and the education and training of tour guides
 - 13 Develop educational workshops and simple materials (perhaps by NRCA and TPDCo) to educate people about ecotourism -- what it is and is not and how to do it
 - 14 Amend the Permit and Licence System to require EIAs for all tourism attractions, not merely "ecotourism " (See recommendations under Ecotourism)
- Expansion of Mass Tourism** South Coast residents and tourism interests have expressed concern about the proposed construction of a Beaches all-inclusive hotel at Whitehouse in Westmoreland. They see the proposed hotel at Whitehouse, the first North Coast-type all-inclusive hotel on the south coast, as representing a different tourism model from the one they have been promoting. The following is quoted from *The Gleaner* of June 30, 1998
- "Of particular concern is how the community will be protected from an influx of outsiders who will come to the area with little regard for its unique culture. The fishermen**

of the area, also expressed concern as to what will happen to them and if there is any provision being made to accommodate them in the development once the fishing villages have been taken over. The residents spoke of the destruction of the original lifestyle and environment in the Negril area, making it clear that they do not want what happened in Negril to happen in Bluefields. South Coast Resort Board Chairman and TPDCo Board member, Merrick Gayle, also expressed reservation that the community will not be able to protect itself from future unwanted development. He said the trend in other parts of the island has been that once one entity is successful in an area other hotels follow suit within a short time. Robert Kerr [of the South Coast Sustainable Development Study] said that the South Coast is a fragile one and any misplaced plan will prove disastrous for the region as a whole."

Another growth-inducing impact that accompanies the construction of a hotel of the type proposed is that people are attracted from elsewhere, often from sustainable rural communities. The mere announcement of the proposed project earlier in 1998 has brought with it, within twelve weeks, an influx of vendors and squatters drawn by the prospect of short-term construction jobs and sales from vending and longer-term service jobs at the hotel.

Recommendations

- 1 Through the South Coast Sustainable Development Plan, all affected government and local interests have an opportunity to formulate a clear policy regarding the type of tourism development that is desired along the St. Elizabeth coast
- 2 That policy should be accurately reflected in the new Development Order, expected to begin in 2001, and in accompanying regulations
- 3 That policy should be respected in all development approvals prior to adoption of the new development Order

- 4 Protected Area status and management plans that formulate criteria for private development will complement other actions designed to achieve sustainable tourism with widespread benefits
- 5 Any tourism proposal should be accompanied by a plan for the housing and transportation of workers, for the participation of local residents in any ancillary activities, for links with local farmers and other suppliers of goods and services and for the avoidance of growth-inducing impacts

Proposed Cruise Ship Terminal at Luana Despite the natural deep harbour, the costs of a suggested cruise ship terminal at Luana (see Section 3.6.4) would be heavy and the benefits questionable. Once proposed as the site of a petroleum refinery and port 1970s but abandoned as infeasible, the site would be no more suitable for cruise ships. A cruise ship pier requires space for taxis and a wide range of support facilities for which the surrounding wetland is unsuitable. Even were the site physically suitable, a cruise terminal attracts taximen, touts, and harassers, as the Ocho Rios example illustrates. In the case of Luana there is no sizable and stable local community to offset the immigrants and no existing infrastructure to add interest to the cruise visitors' stay. With the exception of the head tax, which the cruise industry seems increasingly unwilling to pay, at least in a new location, the money that accompanies the ships tends not to be spent in the places visited. Hotels do not benefit. Only selected attractions benefit unless an entirely new, open and transparent approach to marketing is tried.

There are no immediate points of interest suitable to accommodate cruise ship passengers. While the qualities and attractions of the south coast are plentiful, they require more than a visit of a few hours to be adequately appreciated and lack capacity. For example, the carrying capacity of the beach at Font Hill has been identified as 100 persons, exceeded many times by the anticipated population of Operation PRIDE, Font Hill, while Black River tour capacity has been frozen at the present level. The South West Coast

Development Plan (UDC, 1992) described the fragility of the South Coast and advised against development of Luana as a terminal

Finally, cruise ships have yet to prove that they are environmentally friendly (Royal Caribbean was fined US\$9M in late May 1998 by a US court for polluting the Caribbean with sewage) Jamaica has no agency to monitor cruise ship behavior Cruise ships disturb habitat The reefs around Luana are habitat for manatees and dolphins Cruise ships are notoriously unstable A slight deviation in course resulted in destruction of an extensive area of reef in Florida in 1996

Recommendations

- 1 Seek early declaration of additional protected areas
- 2 Encourage local organizations to participate in management plan preparation, review and implementation
- 3 Publicize and protect existing and potential ecotourism, cultural heritage, scenic and recreational areas and routes (see Chapter 5)
- 4 Through the South Coast Resort Board, prepare assessments (carrying capacity, etc) and guidelines to manage ecotourism/ cultural heritage sites
- 5 Through the South Coast Resort Board, mobilize resources to carry out the required assessments in the most critical areas
- 6 Through the Parish Council and the Resort Board, seek a broad-based community and private sector expression of opinion on the desired future pattern of tourism and actions which should be taken to assist the development of community-based tourism
- 7 In particular, sensitive areas require an EIA on each lot or structure (not merely on subdivisions of 10 lots or more) so that the public can assess the potential cumulative impacts

Ad hoc Expansion of Tourism

The community of Treasure Beach is threatened by unplanned tourism growth As a result, options for development of attractions and for conserving the landscape and the quality of community life are greatly reduced

Recommendations

- 1 Annex G, a speech to the Jamaica Hotel and Tourism Association in 1992 by Ann Haynes-Sutton, would be valuable reading for all agencies, communities and individuals in any way involved in the future of Jamaica's tourism
- 2 Communities are encouraged to initiate organizations similar to the Treasure Beach Tourism Group and the Treasure Beach Citizens' Association (see Annex D)

4 1 5 Development

Development Planning A number of government and statutory bodies carry out sectoral (water supply, agricultural, tourism, etc) and land use planning for the area (see Section 6 1 3) without coordinating developmental objectives and plans Added to this, the parish lacks a current land use plan, the means to enforce such a plan, and development standards, based on a sound analysis of environmental suitability, with which to govern the activities of public and private sector landowners and developers

As discussed above, major development projects are still being conceived (cement production, bauxite mining, rice production, irrigation, housing schemes, all-inclusive hotels and port facilities) without any apparent assessment of impact on adjacent communities or regional resources and desires for sustainability Additionally, a number of illegal activities routinely take place in the project area, including ganja cultivation, construction of houses and initiation of ecotourism projects without permits, unlicensed quarrying, land capture and the sale of morass lands

Available land has to meet growing residential, agricultural, commercial, tourism, natural resource and environmental maintenance demands Decisions have to be made about the suitability and allocation of public and private lands to support the different demands

Recommendations

- 1 Development planning and control in the parish must be coordinated, improved and made participatory
- 2 See further recommendations under Planned Development Projects, below

Illegal Development/Squatting Existing Threat Squatting is common in St Elizabeth, particularly on lands owned by central government, UDC and the Petroleum Corporation of Jamaica. Squatters rarely use soil conservation techniques or plant tree crops, often having no long-term interest in the land. Though squatting combats rural poverty on a temporary basis, poor agricultural practices negatively affect people living downstream who require protection from landslides and floods. In addition, such settlements usually lack adequate sanitation. Future Threat Announcement of the proposed Beaches all-inclusive hotel drew squatters to the Whitehouse-Bluefields coast within 12 weeks. If the project receives final approval, the problem is expected to worsen. Any additional large-scale hotel development will create squatting and harassment problems on a larger scale, resulting in the type of community disruption evident in North Coast tourism centers.

Recommendations

- 1 Appropriately located social housing schemes, preferably with allotments for cultivation, are needed for the relocation of squatters from the Black River Morass and environmentally sensitive coastal areas (see Planned Development Projects, below)
- 2 Selection of appropriate types of development and careful advance planning are required to combat future threats (as discussed under Expansion of Mass Tourism, above)

The Effects of Poor Coastal Planning Decisions in the Past As discussed in Chapter 3, construction of a large subdivision around the western end of Parrottee Pond, based on approval given in the early 1970s

before the ecological importance of the area was appreciated, is threatening the pond's integrity and survival. Coastal erosion, high flood potential and lack of protection from hurricanes make the subdivision a disaster waiting to happen. Great Pedro Pond is also threatened by an old subdivision plan that would not have been allowed if it was proposed now. With roads leading into the water and no provision for waste water treatment this subdivision is potentially disastrous. The pond will either become a dustbowl or accumulate wastewater and become a health hazard, wasting a potential beauty spot and tourist attraction.

Recommendation An opportunity exists for the Parish Council, the Town Planning Department and the Commissioner of Lands, perhaps with NRCA assistance or coordination, to investigate transferring development rights on unbuilt lots to a location that is more suitable for development.

Planned Development Projects It is estimated that a further 2,000 houses will be constructed before the end of the decade which means that at least 500 acres will be required for residential use. Section 2.1.3 indicates that St Elizabeth has been adversely affected by the selection of inappropriate sites for housing schemes.

Efforts have been going on to have the Morass and its surroundings declared a Managed Resource Protected Area. The appropriate approach to such a protected area is to ensure existing residents of a sustainable livelihood. That objective could require some relocation from the area. Vacant land is available within the town of Black River that likely could have been traded for the Luana site to provide a site that was convenient and integrated with other urban uses and services such as schools and shops. Improvement of Black River as a heritage destination would provide jobs that unfortunately are not readily available or accessible at the selected project sites.

The appropriate location of future housing projects will be of critical importance to ensuring the safety and well being of new residents as well as to protecting St Elizabeth's environmental quality. Another

critical element of the protection of environmental quality is the design of new housing sites. Site plans that reduce the amount of grading to a minimum by working with the site topography result in significant cost savings and at the same time can enhance rather than degrade the landscape.

Recommendations

1. Establish criteria for the selection of future housing development sites, giving attention to safety, protected area status (including proposals and needed buffers), employment availability, transportation feasibility, and opportunities for reinforcing existing appropriately-located communities and using existing urban services and educational, health, recreational, commercial and other facilities.
2. Seek funding for a training program in project site selection, site assessment and site planning for the Parish Council and public and private entities involved in planning and reviewing proposals for the development of housing and other project types (industrial, commercial and tourism).
3. In any future housing scheme proposals, encourage dialogue between national housing interests and the Parish Council and other local interests.
4. Encourage arrangements for housing to support the relocation of squatters in the Morass and Font Hill and others living on inappropriate sites (see above under Squatting).
5. Encourage Operation PRIDE to provide environmental sensitivity training to future residents.
6. Through local NGOs, provide civic and community groups with an orientation to the EIA process and ways in which citizens and organizations can participate constructively in the review of draft documents and the revision of proposals.
7. Develop guidelines for land subdivision adjacent to or in the vicinity of Protected Areas and other public interest lands.
8. Determine over-arching public interests (public interest lands, water, and resources) that require special management or investment controls.

Expansion of the Town of Black River The nature and scale of urban development may influence the stability of the wider ecosystem. Of particular concern is the recent local and informal debate about the appropriate direction of Black River's growth. Vacant land exists within the town that deserves to be efficiently and sensitively filled in before expansion occurs. Further development on the east (morass) side would be incompatible with the objectives of a Black River Morass Protected Area and should not be allowed. Development to the north and west needs to avoid strip development and to pay attention to the maintenance/creation of attractive gateways to the town.

Recommendations

1. Affected agencies, including the Town Planning Department, the Ministry of Local Government and Works, NRCA, JNHT and TPDCo, perhaps with the assistance of UTECH, could arrange a seminar for the Parish Council and Black River businesses, residents and friends to explore the assets and needs of the town. Such a seminar could provide information about the opportunities inherent in rehabilitation of the town and careful attention to its urban form and facilitate formulation of a concept and action plan by participants.
2. Request early or interim modification of the Development Order for the Black River area to provide the Parish Council with the legal basis for guidance and protection.
3. Seek private sector sponsorship of the restoration of a High Street structure to serve as a model for others to emulate.

4.1.6 Infrastructure

Upkeep of Existing Infrastructure GOJ assistance is needed with the improvement of roads, bridges and drains needed for the support of agriculture as well as traditional tourism. Once the parish has a comprehensive picture of areas suited for community and nature tourism, assistance will be needed with access to certain of these points. Experience with the road beautification project initiated by

the South Coast Resort Board has shown the willingness of local communities and business to participate in the improvement of infrastructure

Recommendations

- 1 Encourage Members of Parliament to recognize the broader political advantages to the entire parish and to the nation of supporting economic activities through the provision of infrastructural improvements even in areas of sparse population
- 2 Explore the potential for formal collaboration in improvement projects to stretch limited resources

Water The critical threats to the parish are the reduction in water catchment resulting from deforestation as well as from the prolonged drought, and the overdraft and pollution of groundwater

Recommendations

- 1 Require a comprehensive assessment of the water balance of the Black River system before any proposal for withdrawal of water and irrigation is planned (i.e., before preparation of the EIA)
- 2 Provide incentives for the continued conservation of water
- 3 Take steps discussed elsewhere in this chapter to prevent further deforestation
- 4 Undertake a concerted program of tree planting (see Chapter 5)

Sewage The virtual absence of sewers and sewage treatment is a growing source of environmental damage and a growing health hazard. Comprehensive attention is required. Towns and institutions have either no facilities or no functioning facilities. Villa areas may have cumulative impacts that have been overlooked and will in general continue to be overlooked (since the Permit and Licence system applies to subdivisions of 10 lots or more). Residents in both urban and rural areas either have no toilet facilities or pit latrines. Pit latrines in high concentration and/or in areas where the water table is high contaminate ground and surface waters. Industries of all kinds

are freely discharging wastes to the environment, whether at the extraordinary scale of Appleton or at the scale of pimento factories and the recently closed conch factory near Whitehouse

Recommendations

- 1 Ideally, the parish needs a sanitation master plan, perhaps sponsored jointly by the Ministry of Local Government and Works, the NWC, the Environmental Control Division of the Ministry of Health and the NRCA. Such a plan would set policy for different types and intensities of development in different environmental settings, such as the following
 - a Small, low cost, treatment plants should be required for sections of towns and for institutions, ensuring effective operation and maintenance and, where appropriate, making use of existing or created wetlands for nutrient stripping
 - b EIAs should be required on individual structures in sensitive coastal areas to control the cumulative impact of a concentration of villas unless owners can prove installation of an acceptable system (for example, a three-chamber septic tank and dual tile field rather than an absorption pit)
 - c Houses on dunes should be phased out but during that period should be required to install sealed dry toilets or composting toilets to ensure no discharge to the groundwater or the sea
- 2 Regulations for effluents from industrial plants, shops, restaurants, garages, fish processing areas and plants, and vending areas need to be enforced where they exist and formulated where they do not
- 3 Regulation or other sources of water pollution (agricultural chemicals, boat exhaust, etc.) need to be enforced
- 4 Emergency situations requiring immediate attention include public toilets and fish waste recycling facilities are needed at the Black River waterfront

Solid Waste Disposal Only 10 percent of households indicate appropriate garbage collection practices. Seventy-two percent of citizens burn waste in the yard and a further 10 percent dump solid

waste in gullies. The Black River Hospital has been reported as dumping waste into the sea. Font Hill is marred by solid waste including car bodies and garbage dumped along the roadside. Throughout the Parish, garbage is a feature of roadsides and public beaches. According to a report in *The Gleaner*, June 30, 1998, the problem of dumping on beaches is rapidly worsening.

Recommendations

- 1 Move to implement existing and proposed conservation and protected areas and appoint wardens to patrol beaches and report/apprehend offenders
- 2 Urge Southern Parks & Markets to implement a controlled landfill (Ministry of Local Government and Public Works, Norconsult)

4 1 7 Cultural and Social Practices

Environmental stress occurs when natural resources are used unsustainably through poverty, lack of knowledge and shortsighted development policy. Many natural resources are exploited as if they were inexhaustible, with no restraint or control. As the human population increases, the rate of extraction exceeds the natural capacity for regeneration. The preceding sections have described unsustainable and often illegal agricultural, forestry, fishing, industrial and development practices carried out on a large and sometimes officially sanctioned scale. In addition, the parish, like most others in Jamaica, suffers the cumulative effects of less frequent illegal, thoughtless or greedy acts carried out by individuals. In most cases, these actions reflect both a lack of individual awareness of the consequences and a lack of official awareness of or concern about the significance of the consequences. In some cases, poverty, unemployment and lack of housing can explain the actions. In other cases, on the part of all income groups, the issue is a loss of community consciousness of the necessity to use resources conservatively.

Harvesting of Common Resources The harvesting of natural resources to meet economic needs forms a significant threat to the long-term viability of the resource base within the parish. Not only is over-harvesting taking place (fish and shrimp) but new resources (palm fronds) are being harvested while more sustainable ways of harvesting old resources (thatch) are being lost. A combination of economic hardship and lack of formal and informal enforcement of sustainable practices will result in more persons resorting to harvesting common natural resources and further inroads into more pristine forests and swamp forests.

Recommendations

- 1 Support for resource user groups to carry out programs of resource protection and restoration,
- 2 Identification of alternative livelihood strategies, and
- 3 Development of an intensive environmental education program

Uncontrolled Exploitation of Plants and Animals In addition to abuse and overuse of traditionally harvested common resources, illegal hunting of birds, crocodiles, manatees and sea turtles is seriously affecting the ecological integrity of the area. Bird hunting, mainly of columbids and ducks, takes place in the wetlands, foothills and mountains. The regulations concerning shooting are not generally observed. In addition to the middle-class luxury sport, young boys also hunt birds with catapults and calabars.

Turtle eggs are taken unsustainably and nesting turtles are butchered with almost no consequences. Threats also include cutting of mangroves for charcoal and especially for construction poles and the felling of trees for pot sticks and lumber and the overuse and hence rapid depletion of certain plants that are used for the production of craft items.

Recommendations Effective action against the abuses described above will require a concerted effort, including

- 1 Additional wardens to monitor beaches and other sensitive areas,
- 2 Encouragement of the general public to report abuses,
- 3 The cooperation of the Police in responding to reports,
- 4 The cooperation of the Judiciary in imposing appropriate penalties (which may require a program of information about the significance of the abuses and the activities being undertaken to identify and support alternative livelihood strategies)

Praedial Larceny The prevalence of praedial larceny threatens efforts to develop sustainable agriculture and agro-forestry

Recommendations The GOJ recently announced increased penalties for praedial larceny. Implementation requires a strong community will to make clear that the practice is unacceptable. Such an expression needs to be followed up by increased capacity to apprehend and will to impose penalties.

4.1.8 Inadequate Public Awareness and Institutional Capacity

A high level of cynicism is typical of many communities in the parish with respect to the environment. Among other causes, it is based on

- a A perception that there is considerable overlap and conflict in the policies and programs developed by government organizations,
- b Frustration with inaction when environmental problems and breaches are reported,
- c Legitimate concern that big industry, big business and a few influential individuals are able to treat the environment irresponsibly with impunity and often very profitably,
- d A perception that there is too much talk and no action on most issues of importance to particular communities,
- e The lack of any sustained information flow to communities, and
- e The lack of any sustained demonstration of the importance of the environment and the benefits of conservation (studies and plans left incomplete and unimplemented and the lack of funding for

projects that meet the most immediate needs of communities as catalysts for broader action

Inadequate institutional capacity manifests itself in less than desirable levels of planning, development control, regulations, monitoring, enforcement, and judicial response. Many institutions appear to lack the political will to correct the problems that abound. As discussed above, unplanned and illegal developments take place, areas are denuded, uncontrolled harvesting of natural resources occurs, and infringements of the law go virtually unpunished.

Finally, although leadership and the number of effective organizations is growing, the size and complexity of St. Elizabeth means that many more need to be found and nurtured. Existing local organizations, the responsibilities of national organizations and the potential sources of assistance to environmental management in St. Elizabeth are discussed in Chapter 6 below.

4.2 Threats by Ecosystem

The following tables, 20-24, summarize environmental threats from the point of view of the affected resources. The tables follow the same list of goods, services and attributes of the three major groups of ecosystems presented in Tables 10, 11 and 13: moist and dry forests, wetlands, and coral reefs, beaches and coastal woodlands. Readers are invited to add to or modify the identified threats and recommended actions.

4.3 Character, Threats and Opportunities by Bio-Social Region

Tables in Annex D contain information for each bio-social region. The tables are intended to assist with development of strategies and policies by area. They are incomplete and the level of information is uneven. Readers are invited to contribute their knowledge and observations so that these tables can be made more complete.

TABLE 22 DRY AND MOIST FORESTS OF ST ELIZABETH -- ATTRIBUTES , PROBLEMS AND CURRENT ACTIONS

	RESOURCE/ATTRIBUTE	PROBLEMS AND NEEDS	WHAT IS BEING DONE
GOODS			
1	Water supply	Springs drying up due to forest clearance	Forest Reserves established but not maintained
2	Mineral Resources	<ul style="list-style-type: none"> • Exhaustion of bauxite reserves in St Ann and Manchester causing increased interest in mining in Cockpit Country expected problems include destruction of watersheds loss of biodiversity loss of resources increased heavy traffic in roads, noise and dust, port development in tourist areas • Search for new exports and shortage of aggregates in western Jamaica has increased interest in limestone and whiting Expected problems as above • Environmental impact assessment process does not adequately address problems 	
3	Forest resources - fuel	Charcoal burning threatens integrity of woodlands specially Font Hill Problem may worsen with new residents of housing schemes	PCJ has established trial plantings of fuelwood species at Font Hill
4	Forest resources - timber sticks and bark	<ul style="list-style-type: none"> • Mobile sawmills and chainsaws encourage legal and illegal extraction of hardwoods • No replanting • Yam stick industry a major threat to forests • Forest Reserves not protected 	<p>Sawmills to be licenced</p> <p>UWI studying dynamics of yamstick industry</p>
5	Agricultural resources (food fibre)	<ul style="list-style-type: none"> • Agricultural sector in decline, especially livestock • Praedial larceny has caused many to abandon food forests and threatens forestry 	Pilot socioeconomic study of factors contributing to and methods of controlling praedial larceny
6	Forage resources	Goats and cattle grazing in forests prevent regeneration	
7	Wildlife resources	<ul style="list-style-type: none"> • Subsistence hunting Threatens survival of some species e g Ring-tailed Pigeon Jamaican Coney • Sport hunting Largely unregulated • Pet trade Major threat to parrots (mainly on North Coast) • Commercial collection can threaten species (e g butterflies) • Recreation Market small need more interpretive materials trained guides better promotion • Pest eradication parrots 	Most species at risk have been protected (but inadequate enforcement and awareness)
8	Miscellaneous resources	Removal of flowering plants (especially orchids from roadsides)	

	RESOURCE/ATTRIBUTE	PROBLEMS AND NEEDS	WHAT IS BEING DONE
SERVICES			
1	Water supply	Deforestation reduces retention of water	
2	Coastal protection and water quality maintenance	Deforestation increases run-off and siltation, increases frequency of flash-flooding and damages wetlands reefs and seagrass beds	
3	Habitat	Deforestation destroys wildlife habitat Endemic species are lost	
ATTRIBUTES			
1	Biological diversity	See above	
2	Visual quality/ aesthetics/landscape value	<ul style="list-style-type: none"> Views disrupted by quarries, ribbon development, scenic roads cannot be enjoyed because of heavy traffic Absence of footpaths, bicycle and donkey trails endangers lives JPSCo destroys roadside trees 	
3	Education/scientific value	Areas of importance lost before scientifically evaluated	
4	Recreational value	Not generally appreciated Legislation does not encourage development	
5	Uniqueness/heritage value	Protection under JNHT Act not enforced	

TABLE 22, Contd DRY AND MOIST FORESTS – NECESSARY ACTIONS, POLICIES AND COOPERATIVE AGREEMENTS

	NECESSARY ACTIONS	NECESSARY POLICIES AND REGULATIONS	COOPERATIVE AGREEMENTS
GOODS			
1	Ensure important watersheds effectively protected	Better regulations for use of private lands	Ministry of Water/LUDC/ FSCD
2	<ul style="list-style-type: none"> Study to evaluate effects of bauxite mining in other similar parts of Jamaica Improve EIA process and consider all costs (including roads traffic social, options future uses) Increase NRCA involvement in selection of mining areas 	EIA regulations need modification to include better assessment of social costs and options	Mines and Quarries Division Geological Survey Division Private land owners
3	<ul style="list-style-type: none"> Promote fuelwood plantations Search for alternatives (solar energy wind energy) 	Incentives	FSCD private land owners
4	<ul style="list-style-type: none"> Promote hardwood and stick plantations (address problems of finance, technology land ownership) Enforce laws strictly (FSCD needs resources) Search for alternatives 		FSCD private land owners
5	<ul style="list-style-type: none"> Search for new products and varieties Ensure marginal lands fully used Provide access to land close to settlements to discourage deeper incursions into heartlands Enforce Forest Reserve regulations Control praedial larceny 		
6	Grazing on verges should be prohibited, animals should be restricted to fenced areas	Change laws re stray animals on roadsides	PWD, Parish Council
7	<ul style="list-style-type: none"> Public education Alternatives to killing pest species (e g parrots) should be sought Nature hikes Butterfly farming Interpretation networking tour design Subsistence hunting evaluate dietary importance, especially to children Sport hunting hunter education enforcement Pet trade enforcement and education Commercial collecting butterfly farming Recreation better promotion interpretation guides Pests find alternatives to killing 		NRCA Gun Clubs Farmers Educators, NGOs
8	<ul style="list-style-type: none"> Public education Protection of plants in situ 		

	NECESSARY ACTIONS	NECESSARY POLICIES AND REGULATIONS	COOPERATIVE AGREEMENTS
SERVICES			
1	Maintain forest cover		
2	Maintain forest cover		
3	Maintain forest cover		
ATTRIBUTES			
1	<ul style="list-style-type: none"> • Zoning for selected uses (to include strict conservation areas) • Research into control of invasive species which are inhibiting regeneration of forests (ferns, bracken) 		
2	<ul style="list-style-type: none"> • Educate JPSCo about value of trees • Discourage ribbon development • Promote footpaths and trails 		
3	<ul style="list-style-type: none"> • Promote scientific research in Cockpit Country and other forests • Encourage school children to carry out research 		
4	Identify at least one high profile activity that can be promoted once protected area has been declared	Need preconditions for tourism in proposed protected areas	
5	Cockpit Country		

TABLE 23 WETLANDS OF ST ELIZABETH -- ATTRIBUTES , PROBLEMS AND CURRENT ACTIONS

	RESOURCE	PROBLEMS AND NEEDS	WHAT IS BEING DONE
GOODS			
1	Mineral resources	No current interest in peat mining but could be reawakened if price of oil increases	Wetland Policy formulated by NRCA
2	Energy resources	Biomass Has been successfully harvested elsewhere Potential in Jamaica not assessed	
3	Water supply	Springs and ponds drying up as a result of deforestation on surrounding hills getting saline as a result of over pumping of aquifers Proposed Pedro Plains irrigation scheme would reduce flows in Black River system	
4	Forest resources -fuel	Mangroves under pressure from charcoal burners Red mangroves take many years to regenerate	
5	Forest resources - timber, sticks and bark	<ul style="list-style-type: none"> Extraction of high quality red mangrove poles hardwoods from swamp and riverine forests threatens survival genetic resources natural functions Removal of bark for dyes kills mangrove trees 	
6	Agricultural resources	Most fish farms abandoned due to praedial larceny poor returns salinity changes Result - large useless areas, with potential for wildlife management and viewing	
7	Forage resources	Grazing animals limit succession in swamps, mangroves and swamp forests People start fires to burn off old grass and encourage new growth further inhibiting regeneration of forests	
8	Fishery resources	Fishable resources declining as result of pollution overfishing, habitat disturbance Risk of introduced species from fish farms	
9	Wildlife	<ul style="list-style-type: none"> Wildlife resources declining as result of over exploitation Crocodiles becoming habituated to people because they are being fed - will result in attacks Crocodiles being killed and losing nesting habitat Surface water pollution threatens species of economic importance (fish shrimps crabs) and endemic species (fish) Boat traffic disturbs birds and fish destroys vegetation used by shrimp 	Limited study of West Indian Whistling Duck populations and habitat use in progress in Black River Upper and Lower Morasses

TABLE 23, Contd WETLANDS – NECESSARY ACTIONS, POLICIES AND COOPERATIVE AGREEMENTS

	NECESSARY ACTIONS	NECESSARY POLICIES AND REGULATIONS	COOPERATIVE AGREEMENTS
GOODS			
1		Solar salt extraction should not be allowed where pond construction would involve wetland conversion	Ministry of Mining and Energy
2	<ul style="list-style-type: none"> Alternatives should be sought to meet water needs of Pedro Plains Forests should be conserved on hills surrounding wetlands (to reduce flash flooding and siltation) 	All remaining wetlands should be conserved and rehabilitated	NWC UWA
3	Feasibility of harvesting biomass for energy should be examined	Incentives for development of small-scale alternative energy sources	Ministry of Mining and Energy Ministry of Finance
4	Fuelwood plantations should be established on marginal lands round swamps (e g Holland, Font Hill)		Holland Estate PCJ
5	<ul style="list-style-type: none"> No further extraction of timber should be allowed Pilot project to rehabilitate swamp forest should be undertaken 		Holland Estate PCJ
6	<ul style="list-style-type: none"> No further fish pond construction should be allowed in wetlands Wastes entering Black River from Jamculture should be assessed 		Ministry of Agriculture
7	Grazing animals should be excluded from areas selected for regeneration studies		
8	Studies of shrimp and native fishes (eleotrids) needed to identify critical habitats and suggest <u>in situ</u> management		Fisheries Division
9	<ul style="list-style-type: none"> Studies of selected species of economic or biological value (to determine habitat requirements) should be implemented (especially shrimp ducks columbids, crocodiles, fish turtles) Protected areas should include critical habitats for all life stages An ecological assessment is urgently needed for BRUM Ecological updates are needed for other wetlands A management plan is needed for Pedro Pond Inappropriate sub-divisions (Pedro Pond Parottee etc) should be halted pending ecological review 		NRCA, TPD Parish Council, NGOs

	RESOURCE	PROBLEMS AND NEEDS	WHAT IS BEING DONE
SERVICES			
1	Water supply	<ul style="list-style-type: none"> Channelization of upper morass, infilling of herbaceous areas lowering of water table following irrigation and conversion to agriculture reduce natural functions Pollution of groundwater (e.g. from Appleton and Alpart) threaten water quality 	
2	Coastal protection	See above	
3	Habitat	See above	
4	Miscellaneous	<ul style="list-style-type: none"> Use of river system for transportation is threatened by water hyacinth (growth promoted by Appleton wastes) Use of rivers for bathing and washing contributes to pollution Use of Black River for bathing, washing and water supply threatened by Appleton dunder 	River Authority clearing river with new boat and macerating equipment BR water quality study underway
ATTRIBUTES			
1	Biological diversity	Selective felling and cultivation in swamp forests groundwater pollution and changes in water levels threaten regeneration surface water pollution threatens species of economic value	
2	Visual quality	<ul style="list-style-type: none"> Dumped rubbish is unsightly Water hyacinth washes up on beaches Development occludes views of swamps and ponds (Pedro Pond, Parottee Pond) Dunder and other agricultural wastes (coffee pimento) discolor water and are smelly On boat tours people see more tourists and other boats than birds and wildlife 	
3	Education/scientific value	Not currently exploited	
4	Recreational value	<ul style="list-style-type: none"> BRLM Boat tours not designed to maximize experience compete with other uses carrying capacity study does not adequately address problems damage by jet skis and informal tours BRUM Pedro Pond Parottee recreational potential not recognized Font Hill plan for wildlife reserve not implemented tourism development on beach 	NRCA warden with boat for Black River Font Hill wardens and fences in place No other management
5	Uniqueness	Swamp forests threatened by cutting grazing, illegal agriculture	

	NECESSARY ACTIONS	NECESSARY POLICIES AND REGULATIONS	COOPERATIVE AGREEMENTS
SERVICES			
1	Reduction of nutrient levels through control of dunder pollution		Appleton
2	Moratorium on development in or around swamps and ponds or flood plains		Parish Council TPD
3	See above		
4	Reduction of nutrient levels by pollution control		
ATTRIBUTES			
1	Assessments and management plans		NRCA NGOs
2	<ul style="list-style-type: none"> Design subdivisions near ponds and wetlands to maintain views Garbage in wetlands should be removed Study should be undertaken to find out why so much solid waste is being dumped on roadsides and how people can be encouraged to use dumps 		Parish Council Ministry of Water Landowners
3	Importance of wetland appropriate uses		
4	BRLM <ul style="list-style-type: none"> improve carrying capacity study ban jet skis promote canoes in selected areas improve interpretation (centers books leaflets videos), enforce carrying capacity recommendations monitor effects of tours BRUM, Parottee Pedro assess options (including watchable wildlife ponds)		TPDCo Boat tour operators
5	Restore and interpret swamp forests riverine forests		PCJ Holland Estates

TABLE 24 ST ELIZABETH COASTAL RESOURCES - ATTRIBUTES, PROBLEMS AND CURRENT ACTIONS

	RESOURCE	PROBLEMS AND NEEDS	WHAT IS BEING DONE
GOODS			
1	Water supply	<ul style="list-style-type: none"> Coastal wells and springs have become too saline to use Increasing coastal development without appropriate sewage disposal will lead to contamination of groundwater and long-term marine pollution 	Some wells are being monitored
2	Mineral Resources	<ul style="list-style-type: none"> Illegal sand mining is a major threat to beach stability (e g Galleon Beach) Legal mining of dunes behind beach in Great Bay is causing dust and noise nuisance leading to inconvenience and loss of business for tourist industry Could cause long-term loss of coastal stability 	PCJ has limited mining on west of Font Hill through expensive fences and guards More effective action needed elsewhere
3	Forest Resources - fuel	Charcoal burning threatens coastal woodlands and mangroves This could increase when new Operation PRIDE sites are inhabited	PCJ has controlled access at Font Hill and has established trial fuelwood plots
4	Forest Resources - timber, sticks and bark	Pirate boats descend on coastal properties and cut and steal lumber mostly for construction	
5	Forage Resources	Cattle and goats graze on beaches This destroys vegetation, destabilizes sand, and is unhygienic (risk of spreading tetanus)	
6	Fishery Resources	Mariculture projects have floundered because of larceny and politics Fish resources declining -- over-harvesting and bad practices (dynamiting, beach seines, small-mesh pots and nets spear guns)	
7	Wildlife Resources	Moves to develop south coast beaches threaten best remaining areas for sea turtles, crocodile nesting Manatees already lost west of Black River Associated loss of tourism opportunities Coral reefs degraded by dynamiting, anchors	Sea Turtle Recovery Action Plan under development by stakeholders Sea Turtle surveys being undertaken (1997-8)
SERVICES			
1	Water supply	Destruction of coastal dunes, coastal vegetation, threatens stability of barrier to saline	
2	Coastal protection and water quality maintenance	<ul style="list-style-type: none"> Removal of berm can expose reefs to run-off Beach sand mining and construction on beaches can contribute to coastal erosion, which threatens coral reefs and sea-grass beds (and hence marine productivity) and can threaten structures on beaches Changes in beach vegetation and topography detract from natural protection offered by beaches to hurricane action and tsunami, risk of catastrophic damage is increased 	

TABLE 24 Cont d ST ELIZABETH COASTAL RESOURCES – NECESSARY ACTIONS, POLICIES AND COOPERATIVE AGREEMENTS

	NECESSARY ACTIONS	NECESSARY POLICIES AND ACTIONS	COOPERATIVE AGREEMENTS
GOODS			
1	<ul style="list-style-type: none"> Limit and monitor extraction of water close to shore Implement pro- and retroactive schemes to improve sewage disposal in all dwellings and structures Develop simple leaflets to inform house builders and owners about preferred methods of sewage disposal Encourage dry toilets where appropriate 	For existing structures require compliance with new sewage regulations within an agreed period	NWC, Parish Council
2	Better enforcement of existing laws and regulations	Mining should not be approved in tourist areas Residents should have a larger say in approval process Sand dunes need protection	PWD, Mines and Quarries Division, NRCA
3	<ul style="list-style-type: none"> Develop commercial fuelwood plots, possibly managed by burner coops , Promote alternatives to charcoal 		PCJ, land owners, charcoal burners
4	Coastal patrols by marine police		
5	Educate people about risks associated with animals on beaches		Mins of Ag , Health
6	<ul style="list-style-type: none"> Establish fish sanctuaries in appropriate locations Encourage formation of fishing cooperatives Encourage cooperatives to participate in resource management, self-regulation and fish-pot replacement Prosecute use of dynamite and taking turtles or manatees 		FD, fishers, NGOs
7	<ul style="list-style-type: none"> Surveys to identify best habitats, inclusion of best habitats in protected area system, Prepare management plans for selected species Educate landowners on how/why to conserve wildlife on coastal properties Nursery to supply indigenous plants (including xeric species) for gardens Data base of areas of importance to wildlife for NRCA to use in checking proposals Practical suggestions about how to minimize impacts on developed beaches (e g turtle friendly tourism), mooring buoys on reefs Entire coastal strip to be protected 	Ratification of SPAW Protocol of Cartagena Convention	Fishers communities, beach land owners
SERVICES			
1	Education, protection		NWC, UWA
2	<ul style="list-style-type: none"> Education about the value and beauty of natural vegetation on beaches, Education about the need for appropriate setbacks In undeveloped sites no new structure should be allowed between the coast road and the sea A minimum distance from mean high water mark should be negotiated 	Parish Council, community groups, TCPD, NRCA, NGOs	

	RESOURCE	PROBLEMS AND NEEDS	WHAT IS BEING DONE
3	Ports, marinas, safe havens, mooring areas	Pollution associated with boats (gasoline, oil, antifouling agents)	
4	Sites for houses hotels and villas	<ul style="list-style-type: none"> • Sea level rise • Harassment and crime • Some sub-divisions (e g Parottee and Pedro Ponds) were approved before importance of protecting coastal areas was appreciated 	
ATTRIBUTES			
1	Biological Diversity	Coral reefs threatened by sediments, pollution, freshwater outflows etc Wildlife threatened (see above)	
2	Visual quality/aesthetic s/landscape	<ul style="list-style-type: none"> • Beach pollution (solid wastes, sewage) • Visual pollution (shacks garbage, incompatible structures on or near beaches) • Lack of toilet facilities on beaches • Poor condition of public bathing beaches • Over-crowding 	
3	Scientific value		
4	Recreational value	<ul style="list-style-type: none"> • Beaches Restriction of public access to beaches, loss of natural functions of beaches (see above), loss of wildlife habitat (see above) • Limited number of beaches in St Elizabeth - risk of exceeding carrying capacity and contributing to beach erosion, disruption of coastal ecosystems • Deep sea fishing - need for licences and regulation • Diving, snorkeling and glass bottom boats - business opportunities, regulation • Limited number of reefs, all under stress, see above • Coast - Coastal boat tours • Jet skis speed boats, water-sking disturbance, danger and disruption of traditional activities (e g shrimp fishing) • Public bathing beaches abandoned, no facilities • Squatting on beaches particularly bars • Harassment and crime • Noisy beach parties and bars • Accumulation of solid wastes from fishing boats • Risk of dangerously high levels of fecal coliforms 	Beach Policy New law about night noises South Coast Sustainable Development Study
5	Uniqueness and heritage value	<ul style="list-style-type: none"> • Undeveloped beaches are getting increasingly rare globally • Remaining stretches of intact coastline are of rapidly increasing heritage value in their natural state but this is not recognized locally 	Important stretches of beach identified by this study and by South Coast Sustainable Development Study

	NECESSARY ACTIONS	NECESSARY POLICIES AND ACTIONS	COOPERATIVE AGREEMENTS
3			
4	<ul style="list-style-type: none"> Educate people about probable impacts of sea-level rise Effective law enforcement and monitoring particularly for cocaine importation and distribution Moratorium on coastal sub-divisions pending review 		NRCA, NGOs Marine Police, JCF, JDF
ATTRIBUTES			
1	Protected areas and management plans for species designated under SPAW Protocol		
2	<ul style="list-style-type: none"> Education and law enforcement Beach clean-ups Tree planting Redevelopment of public bathing beaches with adequate facilities 		NRCA TCPD, TPDCo, Parish Councils, Community Councils and citizens groups
3	<ul style="list-style-type: none"> Science and education should be promoted Schools should be encouraged to participate in monitoring programs 		Schools
4	<ul style="list-style-type: none"> Carrying capacity studies, strategies to keep coastal developments within capacity Upgrade or lease public bathing beaches (toilets and changerooms) Maintain public access to beaches Training and regulation of fishermen involved in tourist trade NRCA should take lead in controlling squatting on foreshore Levels of fecal coliforms should be monitored on all major bathing beaches 	<p>Policy should cover protection of natural functions of beaches</p> <p>Need to redefine foreshore in areas where beach shape is dynamic</p> <p>Licences, prominent identity tags and training for itinerant vendors</p> <p>Prohibit itinerant vendors on beaches (provide sites for vendors on major beaches)</p> <p>Enforce laws pertaining to noise</p> <p>Strict resort plans and zoning</p>	NRCA, beach property owners or lessors, vendors
5	<ul style="list-style-type: none"> All undeveloped coastline should be protected from development that disrupts its natural functions or visual integrity No beach land currently vested in the Commissioner of Lands or any GOJ agency or QUANGO, should be divested 	A series of contiguous protected areas stretching along the south coast should be designated	Parish Councils NRCA, Fisheries Division, FSCD TCPD, TPDCo beach property owners

5 ALTERNATIVES

This chapter presents several elements of a possible alternative vision of an environmentally sustainable St Elizabeth. It includes some alternative, environmentally sustainable visions and suggested programs for major elements of the economy of St Elizabeth. The various components of this vision are for discussion, modification and elaboration and readers are invited to add their own suggestions. Following review, the chapter is intended both to provide guidance and to be implemented.

Overall, achievement of an environmentally sustainable St Elizabeth would

- 1 Improve the standard of living of people of St Elizabeth and indirectly of all Jamaicans through promotion of wise use of natural resources in economic activities including nature and community tourism, agriculture, light industry, crafts, communications, etc. and the development of strategies to ensure compatible rather than competing activities,
- 2 Encourage the wisest, most sustainable, use of natural resources (e.g. fish, shrimp, crabs, craft materials, timber, game birds, herbal medicines, soils, surface and groundwater, waterways, etc.) and the halting of deforestation and solving of point source pollution, etc.,
- 3 Maximize and conserve natural functions of environment (groundwater recharge, coastal protection, erosion control, climate control),
- 4 Ensure the survival of representative examples of natural ecosystems (particularly those better represented in St Elizabeth than rest of Jamaica, e.g. swamp forest, riverine forest, herbaceous marshes, sand dunes),
- 5 Ensure survival of rare and endemic species, particularly those whose populations in St Elizabeth are of national or international significance (e.g. crocodile, manatee, West Indian Whistling Duck (WIWD), rare plants),

- 6 Ensure conservation of best examples of man-altered landscapes of natural beauty or ecological value (e.g. lignum vitae, guango and palm savannas, dryland farming),
- 7 Ensure the conservation of nationally and locally important cultural sites, monuments and structures (e.g. Black River town), and
- 8 Through effective planning, discourage creeping destruction of landscapes, coastal resources, watersheds and natural beauty

5.1 Conservation -- Forest Restoration

A major element of the alternative vision would be an integrated program of forest protection and restoration, including a collaborative tree planting program, using simple ways to have an extensive and lasting ripple effect. The first part of the program would involve

- The protection of old-growth and relatively undisturbed forests, ensuring that no new roads or trails are created through the Cockpit Country and that destruction of forests by mining or clear-cutting is prohibited,
- Research into and restoration of rare but disturbed forests,
- Research to determine how to encourage regeneration of cleared or badly disturbed non-rare forest, followed by replanting, and
- Protection of selected trees of special importance through Tree Preservation Orders

The tree planting component of the program would involve

- Conducting surveys to determine assemblages of species best suited to specific types of conditions,
- Encouraging planting a variety of income-generating species by farmers on previously cleared land, and
- Planting of trees elsewhere to meet a variety of objectives, including raising consciousness about the importance of trees, creating alternative forms of income, improving climatic conditions and restoring the visual quality of the parish

Farmers have increasingly been cutting trees on their land. The reasons for this trend should be determined and addressed. In the absence of effective education and information from the GOJ agricultural agencies, a vehicle is required to get the message to farmers regarding the critical importance of protecting and planting trees. Credit Unions and bank managers could be educated about the value of trees and a commitment to preserve existing trees and to plant new ones could be made a loan condition to farmers accessing funds. In addition, the recently revived PC Banks could require that 1% of a loan is put into lumber and fruit trees in windbreaks.

Pastures are going out of production as livestock becomes less profitable in Jamaica. Consideration should be given to maintaining the local industry if years of investment and genetic diversity are not to be lost. Alternatives could include production of fuelwood (expanding on the efforts of PCJ at Font Hill), yamsticks and fenceposts as a short-term source of income with agroforestry and hardwood timber being grown for the longer term. The market for the former, while limited at present by the availability of "free" products from the commons would grow if protected areas came into existence to reduce the free access.

The profitability of the bauxite industry can be expected to decline in future, affected by non-competitive labor and recognition of the devastating social and environmental price of mining. As a result, it is time for the JBI to consider alternative revenue-generating uses for land owned on behalf of the industry in preparation for "life after bauxite." It is believed that the Santa Cruz Mountains, where JBI holdings are extensive, are especially suitable for the growth of mahogany. The necessary long-term research and experimentation to determine the best way to nurture hardwood growth needs to begin now in order to ensure significant long-term profits. In addition, research is needed into the most effective and profitable ways to nurture regrowth of trees on mined out land, expanding on the mixed fruit tree planting (ackee, limes and oranges) by Alpart at Nain.

Research would also be encouraged into effective associations of trees providing fruit, fuel, lumber, cabinet wood, pharmaceutical and other products (such as honey from logwood and black mangrove woodlands). Information on such associations should be developed for different areas of the parish and made available to farmers so that they can derive immediate and continuing revenues from their trees while nurturing hardwood trees for long-term gains.

In all of these efforts, special attention would be paid to providing

- Incentives for replanting *lignum vitae*, guango and palms,
- Encouraging the use of living fenceposts, and
- Experimenting with production of alternative yamsticks and potsticks

The tree planting program would change habits, attitudes and values and encourage recognition of the multiple values of caring for trees. Nursery stock is in short supply and the perception is that trees can only be purchased in Kingston (although nurseries exist in Mandeville, Manchester, for fruit and timber trees and the Coconut Board nursery is at Barton's Isle). Schools could start nurseries to generate income for school supplies. Primary school students would be encouraged to plant and care for trees, benefitting from sale of the young trees later in their school careers. This part of the program would expand on the work being done with schools by the Malvern Science Resource Centre on the importance of trees and to instill an understanding of how to nurture as well as plant trees. It would be important to ensure that appropriate trees are planted (for example, native coastal species, not exotic flowering trees, should be planted at beaches).

Tourists and businesses could be encouraged to plant and monitor bamboos on Bamboo Avenue. Villa guests could plant trees. Tree planting competitions could be held, sponsored by businesses, many of whom are willing to put money into environmental projects but cannot find the vehicles.

The South Coast Resort Board in conjunction with the NRCA has received funding from the Environmental Foundation of Jamaica to plant trees to protect beaches. Under the integrated program, this effort and the Resort Board-initiated country road beautification project would be expanded throughout the parish. Utilities and especially the Jamaica Public Service Company (JPSCo) would be careful not to destroy trees during their field operations. Initially organizations such as the resort Board and the service clubs could undertake or oversee tree planting. Over time, community associations and other community-based organizations such as the Health Committees and Police Consultative Committees could receive training in accountability and leadership and become sponsors of revenue-generating tree nurseries and tree planting programs.

Accompanying strategies to prevent destruction of forests and wetland trees would include

- an educational campaign,
- deployment of more Forest Rangers and NRCA Wardens to enforce the Country Fires Act and the Permit and Licence System requirements for clearing of land and forest,
- expansion of the private initiative of Vere Agencies, May Pen, which sells a gas stove and a cylinder of gas for J\$1600 in return for a coal stove,
- reintroduction of the kerosene subsidy and
- encouragement of crafts people to obtain and use waste lumber and small branches and trunks normally discarded in the forest when trees are felled

5.2 Tourism

Within the alternative vision for St. Elizabeth, the parish would make it clearly known that it sees a future that is based on a unique assembly of natural and cultural attractions indigenous to the parish rather than repetition of a tourism model imported from the North Coast. The focus, as the people of the South Coast have stated many times, would be on nature, heritage, and community tourism. Activities would also include ecotourism, defined as "tourism linked to resource protection" whose purpose is to be "of benefit to natural areas instead of being another mechanism for extracting utility from them" and whose challenge is "to guarantee meaningful benefits for local populations."

Elements of the vision (summarized in Tables 25 and 26 and Figure 17) would include

- Promotion of bed and breakfast industry (which would require a more flexible application of standards),
- Identification of a South Coast heritage trail network, using existing trails and parochial roads in St. Elizabeth as the pilot area. The pilot project would use quiet roads, easements over private property and beaches. It would be supported by bed and breakfasts and small hotels and would need simple trail markers (augmented by traditional-style fingerposts as necessary), guide books, points of interest (natural and built environment), interpretation centers and materials, and promotion,
- A system of scenic roads, with footpaths and bicycle, horse, mule or donkey trails and traditional fingerposts,

¹ Ruth Norris in "Can Ecotourism Save Natural Areas?," article published in *National Parks*, January/February 1992, United States

- Special development areas for tourism, to be planned and managed by communities (including Great Bay and Treasure Beach, Black River and Crane Road),
- Treasure Beach and environs Vision Project (No-Negril Project) This would involve local community and stakeholders in development of vision for Treasure Beach in 5 years and 20 years, and, using existing legislation (and new legislation if necessary) design compliance, special projects and incentives to implement it,
- Identification and development of new tourist activities including bicycling, canoeing, kayaking, coastal boat trips, scuba and snorkeling, and watchable wildlife centers, all of which offer opportunities for small businesses, guiding and hireage (suitable sites to be identified, noting that some areas must be zoned for complete protection, see below),
- Restoration and interpretation of Black River as a heritage town, perhaps using the Kingston Restoration Company model, involving planning by local residents and businesses (see Section 4.1.6), soft loans to individual owners to restore structures and uses, and implementation by local investors and builders (needs seed funding and leadership),
- Tourism and conservation (Funding Conservation Through Tourism) – preparation of an integrated plan for Black River Upper and Lower Morass Project to examine constraints and opportunities, develop detailed plans, involve communities and stakeholders in decisions, develop detailed strategies to promote businesses and ensure that revenues are funneled back to conservation and communities, ensure that environmental costs are mitigated, and implement trial projects, and
- Rehabilitation of the Appleton scenic railway as soon as possible (giving serious consideration to Appleton's offer to operate the line), to reopen northern Black River to tourism and increase opportunities in the Cockpit Country, Nassau Mountains and Upper Morass

The overall vision would ideally have a locally designed and managed marketing and reservation system to serve bed and

breakfasts, villa owners, small hotels and attractions and tour owners. Achievement of the vision would require the use of access and conservation easements with private landowners. It would require or aim to earn national government recognition of its contribution to sustainable prosperity. In return, the parish would receive a guarantee against imposition of incompatible land uses in any environmentally valuable or endangered areas where protected areas, resorts, villas and/or attractions exist or would be suitable. Such uses would include mining, quarrying, and additional large-scale tourist facilities and accommodations. Achievement of the vision would require cooperative agreements with prospective operators of attractions or nature tours to ensure their participation in or contribution to the protection and enhancement of the features, ecosystems and/or species involved.

Finally, opportunities would need to be created for education and training of local residents for tour guiding and other occupations in the community and nature tourism sector (with a curriculum currently being developed by Malvern Science Resource Centre). A broad-based awareness and education program would be needed to ensure community support and management of anti-social and anti-tourist behavior. The assistance of community members would be sought with development of recommendations, plans and strategies for

- voluntary compliance (as a result of public education),
- enforcement of laws,
- incentives, and
- suggested project proposals

Initiation of action aimed at achievement of the vision should include a baseline survey to

- determine trends in resource use on the river and associated wetlands and along the coastline,
- assess how any changes are affecting the quality of the experience of visiting St. Elizabeth,

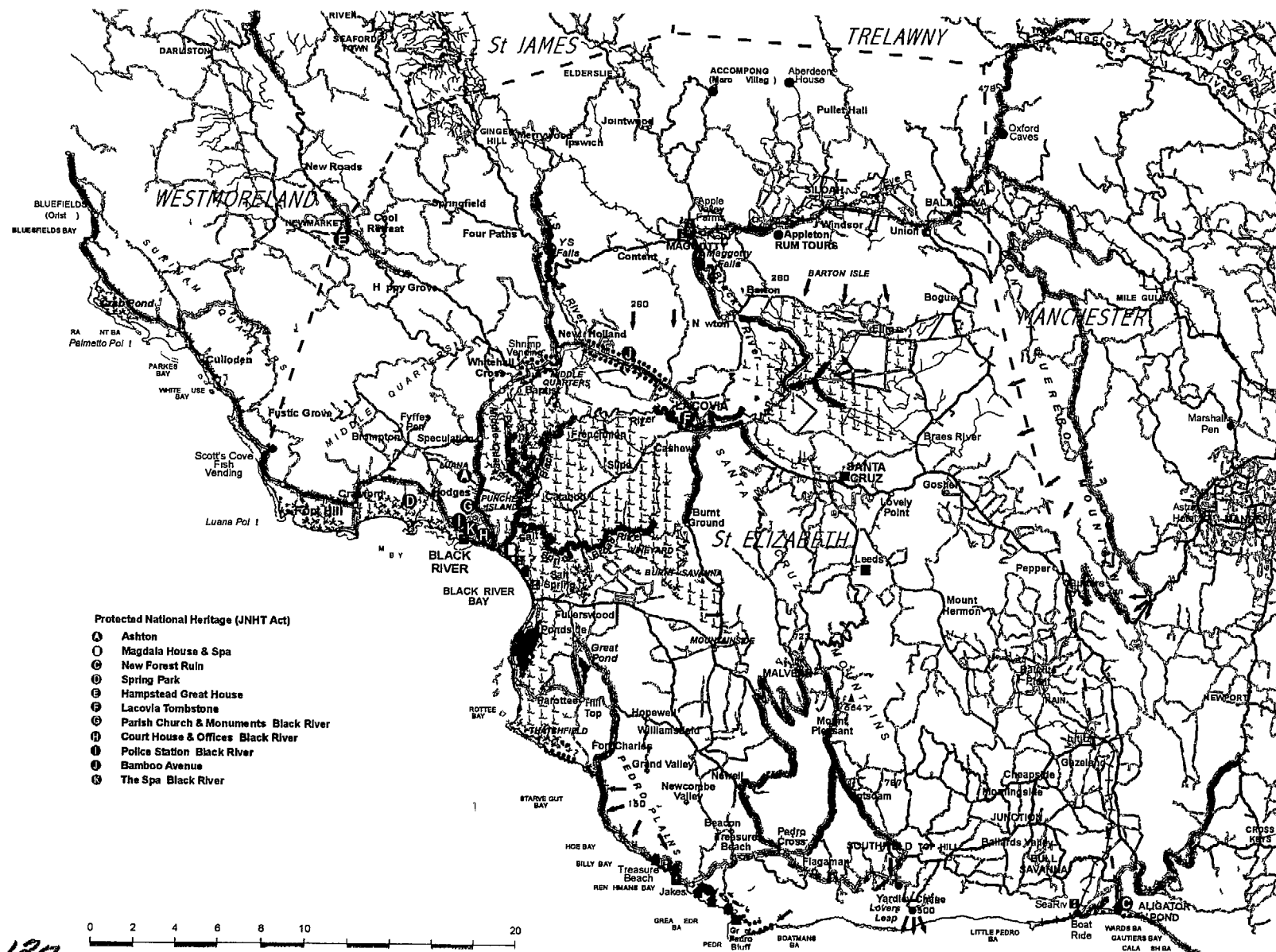
TABLE 25 NATURE, CULTURAL, COMMUNITY AND ECO-TOURISM OPPORTUNITIES

AREA	EXISTING OR POTENTIAL USE
Scotts Cove	Scenic picnic spot and diving (fish vending area requires major rethinking)
Font Hill	Wildlife Reserve and beach (n b limited carrying capacity)
Malcolm Bay	Scenic beach and possible mangrove and turtle watches and interpretation center
Black River Lower Morass and Parottee Pond	<p>Range of possible linked activities</p> <ul style="list-style-type: none"> - Punches (under-water springs) - Areas reserved for canoes - Boat trips from Lacovia north and south - Shrimp museum, interpretation tours and restaurant - Thatch center (improved products demonstrations of techniques) - System of large and small interpretation centers and nature trails - Parottee Pond bird hide - Logwood and natural dyes craft center - Areas zoned for recreational fishing - Various scenic routes around and through swamp
Black River town	Heritage site with main street restored to appearance of C19th with craft and interpretation centers, museum, restaurants and other attractions
Pedro Ponds, Back Seaside and Pedro Bluff	<p>Jointly owned private nature park with walks and possibly bicycle tracks (?) around ponds, through pastures and thatch groves, up escarpment and across bluff, picnic spots cave visits, geological points of interest interpretation center bird watching hide</p> <p>Cactus nature reserve</p>
Lover's Leap/Yardley Chase	<p>Old parochial road to sea, opportunities for hiking, camping and mule packing on pattern of Valley Hikes in Portland</p> <p>Possibility of cliff walk on easements through private lands to Alligator Pond (if owners agree)</p>
Alligator Pond	Opportunity for expanded villa accommodation limited canoe tours on river, public bathing beach, center for fish restaurants boat trips to Alligator Reef and along coast Area needs considerable up-grading and improved water supply
Milk River to Alligator Pond	Coastal walks
YS Falls	Waterfall possible interpretive center and guided hikes
Lacovia	Historic sites include Tombstone battle site Also attractive ponds for bird watching (and fishing)
Black River Upper Morass	Possibilities for canoeing, walking bird-watching hides and interpretation centers
Lacovia, Nassau, Middle Quarters and Don Figueroa Mountains	Possibilities for walks and view points
Cockpit Country	Cultural sites (Accompong) great houses, bird watching caving, natural history tours and walking
Other	

TABLE 26 PROTECTED AREA PROPOSALS

AREA	PROPOSED CLASSIFICATION AND EXTENT N B The areas suggested may overlap, because the most manageable and ecologically appropriate units are yet to be defined
South Coast	From St Thomas to Negril, including a series of more-or-less contiguous areas and the adjacent shelf Areas adjacent to St Elizabeth include Canoe Valley to the east and southern Westmoreland to the west
Fonthill	Proposed Wildlife Reserve best designation to be determined
Black River Upper Morass	Proposed Ramsar site Proposed Managed Resource Protected Area.
Parrottee Pond to Starvegut Bay	Proposed Managed Resource Protected Area (privately owned)
Pedro Ponds, Back Seaside and Pedro Bluff	Private nature reserves
Lovers' Leap and Yardley Chase	Currently a Forest Reserve Protected status to be maintained, probably as Managed Resource Protected Area
Yardley Chase to Alligator Pond	
Alligator Pond dunes and mangroves	
Lacovia Mountains	
Nassau Mountains	
Santa Cruz Mountains	
Don Figueroa Mountains	Mostly in Manchester but important for conservation of Upper Morass
Cockpit Country	High priority protected area - appropriate definition to be determined
Other/comments	

- assess the extent of ecological and socio-economic effects of associated developments (e.g. increased number of tourists in Black River, expansion of hotel and villa rooms, etc),
- continue to monitor the carrying capacity of the river system under existing and alternative patterns of use,
- carry out "willingness to pay" survey to determine economic value as well as what people will contribute towards protection of natural resources, and
- develop strategies to achieve sustainability (including guidelines for boat operations, financial and legal strategies willingness to pay for national park/protected area development, improved planning, design, enforcement and public education)



ST ELIZABETH ENVIRONMENTAL POLICY FRAMEWORK

Figure 17
Scenic Areas, Vistas & Sites of Interest & Importance

- LEGEND**
- Morass / Wetland
 - Mangrove
 - Parish Boundary
 - Road Class A
 - Road Class B
 - Road Class C
 - Other Roads
 - Railway
 - Seasonal Gullies & Drainage Features
 - Small Rivers & Streams
 - Large Rivers
 - Ponds
 - Coral Reefs
 - Scenic Road
 - Scenic River
 - Waterfall
 - Hotel / Guest House
 - Sandy Beach
 - Villas & Second Homes
 - Tourist Attraction
 - Town
 - Sand Dune
 - Peak
 - 654 Approx Elevation (Metres)
 - Direction of View

Base Map is derived from 1988 Jamaica 1:50,000 Metric Series Map Prepared by Natural Resources Conservation Authority Technical Studies & Environmental Information Systems Branch with assistance of Technical Support Services, Inc. Technical Assistance Contractor to the GOJ. USAID Development of Environmental Management Organizations (DEMO) Project July 1988



Natural Resources Conservation Authority
on behalf of the Government of Jamaica

5.3 Agriculture

St Elizabeth's agricultural assets can be maintained and improved for greater profitability and sustainability. Some of the elements of an integrated program were touched on in Chapter 3. A key requirement is for Government support in the matter of competition with St Elizabeth produce. The following is a listing of the initiatives that could work together to achieve the vision.

- Improvement of farm roads,
- Incentives for young people to enter and remain in farming,
- Incentives for /assistance with installation of rainwater catchment tanks to supply water for irrigation,
- Instruction in the use of greywater,
- Incentives to farmers not to cut trees (see Section 5.2),
- Lobby for livestock industry or seek viable alternative land uses,
- Pilot project to control praedial larceny and promote food forests,
- Organic farming, promotion, techniques development, demonstration projects, marketing,
- Yam stick cultivation and alternatives,
- Cultivation of plants for craft materials and herbal medicines

A major component of the vision is a set of actions designed to reduce the wastage of produce (currently estimated at 60% of vegetable crops) and to add value. Needed activities include:

- Conservation, research and development of varieties best suited to the drought and soil conditions of South St Elizabeth,
- Identification of new uses for native tree crops,
- Research and development of essences (flavoring extracts), herbs and spices,
- Improved technology for sun-dried tomatoes, peppers, fruits and other appropriate crops,

The GOJ directs farmers to the Jamaica Agricultural Society (JAS) and the Rural Agricultural Development Agency (RADA). Neither organization is perceived as in touch with local farmers offering

practical advice. However, a more direct and practical approach would be establishment of a branch of SRC that could be connected with an EFJ-funded organic farm in Mandeville, Manchester, and involve young scientists at UWI in microbiology, food science and environmental science. Research and development in the areas of flavor extraction, solar drying, use of native trees and improved species and marketing of organic produce could all help ensure that the region continues to fulfil its potential and contributes to making Jamaica productive again in an environmentally sustainable way. The following are among many examples of lost opportunities:

- passion fruit extract is imported into Jamaica,
- Grace Kennedy pumpkin soup extract powder is made in the USA from Jamaican pumpkins,
- castor oil is imported rather than derived from native trees, and
- cooking chocolate made in Williamsfield is said to be superior to the US product but is not well-known locally or exported

Major employment opportunities exist in value added produce-based industries but are not yet being realized. A two-day meeting of Members of Parliament and the Prime Minister's Advisor on Technology was held in St Elizabeth on March 15, 1998. A repeat meeting is needed to examine linkages between agriculture, technology and the environment. Achievement of goals for fresh, processed and value-added products will require a relatively constant supply, suggesting the need for agricultural cooperatives to market produce and supply the new factories and hotels. With organization, it might be possible for local cooperatives to arrange agreements with a hotel such as Beaches for purchase of local produce and to put supplying farms on the visitor tour list.

5.4 Alternatives for Sustainable Use of Common Resources

Improvement in Craft and Marketing Several groups of women in the Black River Lower Morass derive their livelihoods from the use of sable palm fronds. The crafts they weave are part of an integrated and complex set of traditional activities that assist in supporting the income of several small-scale subsistence families in the region – baskets for shrimpers, fishpots for fishermen and more decorative craft for the tourist market. The sable or thatch palm is becoming scarce and less accessible, affected by overuse and by destruction by cattle. The viability of the crafts is also threatened because the men who harvest the fronds in the morass now charge for doing so, while payment and access to markets are controlled by middlemen. The alternative vision is one in which thatch palm plantations are begun and managed by the craft groups, assistance is provided with improved designs and crafts are sold directly and therefore more profitably.

The vision also includes encouragement of a greater variety of crafts. These could include furniture with woven/traditional basket weave insets, hand decorated items (furniture, tiles, fabrics), clay tiles, pots and models, tie-dye and batik using local natural dyes, weaving using locally grown cotton, and production of simple (very fashionable) resort wear using local motifs. Where possible, local production centers would be open to visitors as "living museums" with shops. For example, a traditional dye center and logwood museum could be established where the history of natural dyes would be illustrated and natural dyes would be made. Goods made with the dyes could be sold in the museum shop.

Basketry, Woodcarving and other Handicrafts An improvement in the quality of the finished product is necessary to compete on the wider market. However, (decentralized) skills center(s) and (centralized) marketing would assist communities to realize the full potential of this industry. Intervention could build on the initiatives of SDC in Mountainside and Operation PRIDE in Vineyard.

Thatch Palm Cultivation Conservation will be best practiced through training in sustainable Sable or Royal Palm cultivation for specific groups for whom use of palm products is an important livelihood strategy. Potential sites exist in Vineyard, Slipe and Great Bay. In Vineyard, a group of women is currently organizing itself into a formal CBO and has identified a Thatch Reserve area. If thatch seedlings can be produced economically and cultivated easily, crafters may benefit from a program that enabled them to raise thatch in their own yards. Unused government land could be used for community thatch supplies if an effective management system is developed. (Refer to Annex H for details.)

Fisheries and Shrimp Harvesting A study of the biology of the main commercial shrimp and shrimp species is required in order to identify whether production can be enhanced by habitat management in a way consistent with conservation of the morass and coastal habitats. There are several potential shrimp farming sites and small-scale activities may be the most appropriate. A feasibility study (as above) is necessary (see Annex H for details).

There is a potential site for shrimp processing at Coopers Corner in Middle Quarters. A feasibility study should examine environmental impact, cost-benefit ratio, marketing, waste management, and impact on the social relations between female hugglers and male fishermen. As a result of NRCA intervention, a group of hugglers is experimenting with a solar oven, which is being used to dehydrate shrimp.

Small Scale Ecotourism There is great potential for sustainable tourism initiatives. Several possible sites and sources of local skills have been identified in the Vineyard and Slipe areas for rafting ventures. The potential for ornithology and trekking with local guides exists in Great Bay and Galleon Beach. Several local ecotourism initiatives enjoy national success.

The development of tourist attractions could also include visits to interpretive centers such as the dye center suggested above. Shrimp fishing is another prime candidate, where displays providing information on the shrimp and its life cycle and live or audio-visual presentations about traditional sustainable harvesting practices could be followed by canoe trips. All of the following activities have potential for similar interpretive centers.

Oyster, Clam, Crab, Conch, Sea Turtle, Lobster and Irish Moss Cultivation The potential for mariculture projects exists within the Morass at Punches and Frenchmans, and on the coast at Parottee, Galleon Beach and Great Bay. Cultivation of Irish Moss, Lobster and Crab appear the most viable, the latter being seen as the most sustainable in ecological terms.

Small scale, community based operations may be most appropriate, but technical clarification of the issues involved is necessary. In some cases, these projects would form the basis for value added processing and crafts as well as points of interest for nature and community tourism.

Natural Pharmaceutical and Cosmetic Products Several local sources of knowledge and supply of these natural products have been identified. Marketing potential needs specialist opinion.

Beekeeping Beekeeping has economic potential in areas of where Logwood trees are plentiful and suitable for producing high quality honey. Black Mangrove also produces fine honey.

Agro-forestry Both the Forestry Department and RADA have expressed interest in supporting agro-forestry projects in the Lower Morass. Fruit trees represent a food stock (especially important during periods of seasonal stress) for the poorer sections of society (e.g. ackee, breadfruit and mango) and a viable commercial activity for the more affluent (papaya and 'exotic' fruit).

Fish Farms Further research into the environmental impact of effluent is necessary and guidelines on acceptable parameters for the discharge should be written and applied to the farms. Construction of a biodigester may reduce pollution from the waste from fish processing. Aquaculture has contributed financially to the construction of a biodigester at Elim Agricultural College, which provides cooking gas to the kitchen and regularly disposes of a proportion of the company's waste fish carcasses there. Such initiatives should be encouraged.

Fishing This element of the vision would see control of the use of blocking gear such as large gill nets or weirs that block access to inner waterways. Spearfishing and dynamiting would be controlled by a combination of self regulation and effective enforcement. Some fishermen would find supplemental or alternative occupations and income sources related to nature and community tourism. These could include fishing and diving boat trips, boat trips, guided walks and mariculture. Following a model developed at the Hol Chan Marine Reserve in Belize,² such opportunities could support participation in protected area management and result in a reduction of fishing pressure and improved standards of living.

² TSS, Inc., Study Tour of U.S. and Caribbean Parks and Protected Areas. Final Report. April 1997.

Please use this space for additional comments

6 ORGANIZATIONAL STRUCTURE AND STRATEGY

The previous chapters of this draft EPF have noted current and impending threats to the environment. They have also noted opportunities to build on the environmental and social strengths of St. Elizabeth for sustainable and broad-based economic benefits. Action to counter these threats and use the opportunities depends on

- Creativity, of which there is no shortage,
- Coordination, leadership and incentives, which need to be encouraged, and
- Enforcement, which is either nonexistent or ineffectual, at best

These challenges to implementing a new vision are compounded by the area's size, its social and ecological diversity and the urgency of the need to address threats and opportunities. Threats are multiplying and opportunities being lost at an accelerating rate. As a result, **St. Elizabeth faces a set of Now or Never choices**

6.1 Stakeholders, Residents and Resource Users

Box 7 lists stakeholders with a stake in the environmental quality of St. Elizabeth and its areas of critical significance. They include formal and informal groups, public agencies and private interests including landowners, businesses and developers. Most share economic and environmental policy interests. Many government agencies and citizens' associations have relatively narrow areas of focus but could be critical elements in a coordinated network if linkages are understood and common goals are articulated. Please add any organizations or interest groups that may have been overlooked.

This chapter describes the players or stakeholders and their roles, sources of training and assistance with proposals and project funding, and strategies for building leadership and organizational strength.

BOX 7 ST. ELIZABETH ENVIRONMENTAL STAKEHOLDERS

- | | |
|--|--|
| - Industrial companies | - Consultative Committees attached to Police Stations |
| - Estate owners and operators | - Health Committees attached to Clinics |
| - Wholesale and retail businesses | - Neighborhood Watch Community Associations and Youth Clubs |
| - Hoteliers, Villa owners and Bed & Breakfast owners | - Professional associations |
| - Attractions and Tour operators | - Service Clubs: Rotary, Kiwanis, Lions, etc. |
| - Commercial farmers (arable and livestock) | - Chamber of Commerce |
| - Other commercial and service businesses | - Local environmental groups, e.g. SEEPA |
| - Tour guides and workers | - National environmental groups, e.g. JCDT, NEST |
| - Other wage earners - full-time and seasonal | - International environmental groups, e.g. The Nature Conservancy |
| - Small-scale and subsistence farmers | - National researchers, e.g. University of West Indies |
| - Fishermen: morass and deep sea, fish and shrimp | - International researchers, e.g. University of Florida |
| - Shrimp sellers: higglers | - Quasi-governmental coordinating bodies, e.g. South Coast Resort Board |
| - Charcoal makers, construction loggers | - Local/national politicians and political bodies, Parish Council, MPs |
| - Craft persons: basket makers, wood carvers | - National government, e.g. Ministry of Environment and Housing |
| - Vendors - local and tourist oriented | - Bilateral and multilateral donors and funded projects: e.g. USAID/DEMO |
| - | - |

6 1 1 Active Local Organizations

A number of local organizations are already active and able to contribute to the sustainable management of the St Elizabeth environment at the regional and parish-wide level. Organizations at the community level are fewer in number but there is potential for others to form. The key is ensuring that fora exist in which leaders can emerge and, with leadership training and support where necessary, catalyze groups around issues of common concern. These organizations typically understand or are open to demonstrations of how environmental issues affect their self-interest and the community interest. Most therefore have an incentive to contribute to improvement schemes and activities.

St Elizabeth Parish Council The Mayor and the Parish Council have shown great interest in the quality of the environment. The Council's power in the land use planning process is a major factor in the environmental sustainability of the area and the production of a new Development Plan and relevant Development Order is vital. At present the Council has limited experience in implementing environmental protection policies and responsibility is shared between local and national authorities. The Council could benefit from training in the economic benefits of conserving the stock of natural and cultural resources and profiting from it in ways that are sustainable. In addition, the Council needs appropriate advice from bodies such as NRCA and the Town Planning Department in order to develop local policy, standards, and review, approval and monitoring procedures. The Parish Council is a member of the South Coast Resort Board and could benefit from constructive relationships with other effective environmental and quasi-environmental organizations.

St Elizabeth Environmental Protection Association (SEEPa) To effectively fulfil the role of leading environmental management organization in the Parish, SEEPa is broadening the focus of both its mandate and its membership. SEEPa might consider formation of a Steering Committee (to direct policy, nominate board members and select a paid Executive Director) and introduction of ad hoc

committees to focus on specific issues. In addition to a paid Executive Director with experience of environmental advocacy and the NGO sector, other staff positions could include some combination of a Deputy Director, Treasurer, and Administrative/Program Manager, one of which may be a Peace Corps volunteer.

South Coast Resort Board This forum for the local tourism industry is dynamic, broadly representative, resourceful and efficiently managed. There is a clear consensus among members in favor of taking a lead role in protected area management. Membership includes hoteliers and others active in the tourism industry but also includes the Parish Council, the St Elizabeth Police, the Chambers of Commerce of St Elizabeth, Manchester, Clarendon and, soon, Westmoreland, schools, and many public, quasi-public and private agencies, institutions and interests. The Resort Board, created along with other regional resort boards in 1995, grew out of the South Coast Tourism Committee. It has worked closely with TPDCo, the source of most of its project funding to date. However, its successful initiatives are beginning to attract locally funded continuing projects. While the emphasis to date has tended to be on tangible construction projects, the Board has expressed strong interest in protected area management.

Black River Chamber of Commerce The Chamber of Commerce has a growing interest in protecting environmental quality. Many potential improvement schemes will require the involvement of the private and commercial interests represented by the chamber.

Community-based and Private Voluntary Organizations As noted, the number of local organizations and individuals in the local environment is relatively small. The communities of Southfield and Treasure Beach in particular have generated a level of leadership and cooperation that is evident in the activities of the South Coast Resort Board, the orderly management of Southfield and the activities of the Treasure Beach Citizens' Association, the Treasure Beach Tourism Group and the Black River Citizens' Association.

Private Sector Interests An effort is needed to recruit private sector support for efforts to design and implement priority environmental improvement projects. The local and worldwide marketing opportunities associated with such activities hardly need to be stressed. Ideally, private interests, such as Appleton Estate, that are now damaging the environment would not only respond to the pressure exerted on them by local interests and government but would become active supporters, and ultimately beneficiaries, of improvement efforts. A number of private interests are supporting environmental improvement and protected area activities elsewhere in the island, Negril and the Palisadoes being examples.

Ad hoc Interest Groups and Organizations, e.g., South Ocean Development Company This was a group of some 30 professionals and farmers in the Southfield area that developed a plan in 1995 for expanded and sustainable use of Lovers' Leap. The plan included a marine park and a two-day trail leading to the sea with facilities for hikers to camp overnight. It offered an example of how public and private objectives can blend and potentially be realized within the context of a vision of environmental sustainability.

Service Clubs The various service clubs are very accountable and motivated. They offer an effective vehicle for accomplishing short-term projects. Their regular leadership turnover means they tend not to be well suited to long-term, multi-year project oversight. However, a focus on exposing the clubs to the challenges described in this document could motivate some members to become active in longer-term projects and/or environmental organizations.

Health Committees The active committees attached to each clinic have the potential to oversee projects such as tree planting.

Consultative Committees These groups attached to Police Stations liaise with the police, do community policing and undertake small projects. Those in Alligator Pond and Malvern have been particularly active. In the overall charge of the Custos and with Police oversight, these committees could undertake environmental

improvement and even educational projects. The immediate need is for leadership training.

Youth Clubs Youth clubs are active in St. Elizabeth. Some in the south coast area in particular are skilled in fund raising and show an interest in environmental matters.

Churches As pointed out at the June 1997 St. Elizabeth Expo (Tuesday Forum) churches in the parish have an important role to play in increasing awareness of the need to respect the environment.

Teachers' Colleges The concentration of teachers' colleges represents a most important potential resource to the parish and one that does not appear to have been adequately accessed to date. Colleges include the Bethlehem Moravian Teachers College, the Malvern Teachers College and The parish should also make sure to benefit from the presence of Elim Agricultural College.

Malvern Science Resource Centre This is a highly effective local organization, dedicated to public education through community outreach, extension and research programs. It offers excellent programs in science and environmental awareness for schools throughout the parish. It is also an important source of information and guidance to local organizations engaged in environmental improvement and management.

Schools It is widely acknowledged among individuals active in environmental activities in the parish that the schools represent a significant opportunity for changing attitudes and involving the community in the environment. The Malvern Science Resource Centre works on a regular basis with some 90 primary through tertiary schools in St. Elizabeth. The practical environmental activities of many of these schools were displayed at the June 1997 St. Elizabeth Expo. The concentration of respected secondary institutions, including Munro, Hampton, Newell, St. Elizabeth Technical High School and B.B. Coke Comprehensive High School adds to the potential pool of volunteers and mentors in the parish.

Agricultural and Resource User Groups It is important to give attention to the concerns and needs of fishermen and, fishermen's cooperatives, crafts makers and vendors, shrimp fishermen, shrimp higglers, cattlemen, and dairy cooperatives and other groups

Work undertaken in 1997 with the shrimp higglers of Middle Quarters, the shrimp fishermen of Slipe and Frenchmans, the thatch craftspeople of Vineyard and the sea fishermen of Malcolm Bay all revealed the potential for effective participation in focused and broad-based environmental projects. The key is providing the forum in which each group is able to articulate both problems and solutions. If assistance with preparing proposals and with managing projects can be provided, the potential for these groups to produce leaders who will be able to contribute to a network of environmentally active organizations appears to exist.

Mandeville Weekly This local newspaper has launched a community development division and is currently implementing environmental improvement projects in St Elizabeth, including the proposed Black River Protected Area. The newspaper itself is already an influential source of environmental information, education and perspectives. It could become a central element in a broader-based program of environmental education.

Community Development Foundation (CDF) This commercial revolving credit fund has developed a solid track record in its loans to small-scale farmers. CDF has an excellent relationship with the Environmental Foundation of Jamaica (EFJ), described below. The potential for soft loans to support community-based environmental improvement projects should be investigated.

6.1.2 Public Sector Agency Roles and Responsibilities

Issue 70 Inadequate Institutional Coordination Improved coordination among these institutions is required to ensure more effective development planning, regulations, monitoring, enforcement and judicial response. Unplanned and illegal

developments take place, uncontrolled harvesting and theft of natural resources occur, and regulations are often broken. Greater political will is also required to tackle the continued and accelerating breaches and repetition of development patterns that have proved to be mistaken elsewhere.

The Natural Resources Conservation Authority (NRCA) has the lead responsibility with respect to the quality of the physical and biological quality of the environment of the parish and watershed. The NRCA is charged with overall management of Jamaica's environmental resources and monitoring of pollution levels and mandated to "take such steps as are necessary for the effective management of the physical environment of Jamaica so as to ensure the conservation, protection and proper use of its natural resources."

The imminent establishment of an office in Black River should increase the agency's ability to monitor implementation of policy and address breaches more effectively than is possible at long distance. Plans are for the office to be staffed with a planner, a scientist, an education specialist and an enforcement officer.

The Jamaica National Heritage Trust (JNHT) is the lead agency responsible for the quality of the cultural and historical patrimony. JNHT evaluates and preserves places of cultural interest and aims to conserve buildings that contribute to Jamaican history and national identity. Having primary responsibility for the landmarks and archaeological sites, JNHT considers the management of critical resources such as the town of Black River to be a national priority. The agency has proposed designation of the town as a national monument or national heritage site.

The Tourist Product Development Company (TPDCo) develops and improves Jamaica's tourism industry by planning, implementing, and supporting improvement projects in resort areas. TPDCo could contribute its support to establishment of protected areas, the development of local management capacity and the planning and coordination of related environmental improvement projects.

Other GOJ Agencies The range of resource-based activities important in the economy of the parish means that several other GOJ ministries and agencies play central roles in both altering the environment and protecting it for sustainable use. Cooperation with the NRCA by these and other GOJ agencies is vital because environmental issues are frequently related to the mandates of several departments. The NRCA's team continues to enlist their support for the EPF. Box 8 presents the roles and activities of other public agencies with a stake in the future of St. Elizabeth and Black River.

Jamaica Bauxite Institute (JBI) undertakes research on behalf of the bauxite industry in Jamaica. It owns land on the Santa Cruz Mountains where local residents have overwhelmingly stated their opposition to mining. As the nation's bauxite resources become scarcer and its profits and net benefits from mining diminish, it would be desirable for the JBI to diversify its own activities. Research into improved selection of areas suitable for mining, improved clean up and restoration of mined areas and alternative uses of land are all required. Indeed, research focusing on growing hardwoods could spare the Santa Cruz Mountains, generate a sustainable source of significant revenue that would grow as the country weans itself from bauxite dependency, and also support reforestation of mined areas.

6.1.3 Other Non-Governmental and Private Sector Stakeholders

Several Kingston-based NGOs are mandated to support environmental improvement activities and have expressed interest in the St. Elizabeth area, including

Environmental Foundation of Jamaica (EFJ) The EFJ supports the protection of the environment and children's rights. The EFJ makes project grants to environmental and development NGOs and could provide funding to support environmental improvement

projects in St. Elizabeth. It already supports the Community Development Foundation which on-lends funds to small farmers.

National Environmental Societies Trust (NEST) NEST was established as an umbrella organization to provide training, technical assistance and organizational support to local NGOs and community-based organizations working on environmental issues. With the assistance of the EFJ, it would be desirable for NEST to follow the lead it has set in Port Royal by placing at least one animator in the community of Black River. Animators could undertake community outreach and assist the NRCA, SEEPA, the Resort Board and others in building local environmental management capacity.

Jamaica Environment Trust (JET) JET has a particular interest in raising environmental awareness in schools and has been successful in arranging private sector sponsorship of competitions between schools and individual school children. JET has also successfully organized beach clean up activities and is a source of advice, if not direct assistance.

6.1.4 Other Organizations and Interest Groups

Please note any organizations or interests that may have been overlooked or portrayed incompletely or inaccurately and make your interest known to the NRCA.

BOX 8 SUMMARY OF GOVERNMENT AGENCY ROLES AND ACTIVITIES IN ST ELIZABETH

St Elizabeth Parish Council The Parish Council oversees the planning permission process and is responsible for ensuring that proposed developments conform with the current Town Planning Development Order. In addition, the Council may refer applications to NRCA and JNHT to ensure that they are in compliance with environmental and heritage regulations.

Natural Resources Conservation Authority The NRCA administers the environmental Permit and Licence System. It oversees the preparation of Environmental Impact Assessments and monitors compliance with the terms of permits and licences.

Town and Country Planning Authority Through the Town Planning Department the TCPA prepares Development Plans and Development Orders to guide local authorities throughout the Island in the processing of development proposals. The TPD will begin a Development Order update in mid 2001.

Commissioner of Lands This agency is charged with managing Crown lands and is able to lease land to various organizations including other government agencies. The Commissioner has direct control over some 20 percent of the land in the St Elizabeth.

Public Works Department The PWD is responsible for construction of roads, bridges and other elements of infrastructure.

The Ministry of Water This new ministry oversees the supply and quality of water through the agencies listed below.

National Water Commission The NWC has limited direct responsibility for water quality in St Elizabeth as the parish only has no working public sewage treatment plants. The NWC acknowledges that sewage effluent must be properly treated if surface, ground and coastal water quality is to be successful.

The Environmental Control Division's mandate includes the control of point discharges of sewage and other wastes.

Water Resources Authority The WRA is responsible for managing the volume and quality of Jamaica's surface and ground water.

National Irrigation Commission the NIC is responsible for keeping open the channels of the Black River and its tributaries. It recently purchased equipment to cut and macerate water hyacinth in the Black River.

Southern Parks and Markets Ltd has responsibility for the management and cleanliness of public markets and for solid waste disposal, collecting waste and managing approved disposal sites.

Ministry of Agriculture The Ministry of Agriculture sets agricultural policy, from research and development to import and export of agricultural products.

Pesticide Control Authority The PCA is responsible for regulating the safe use of agricultural chemicals.

Division of Mines and Quarries This Division oversees the issuance of mining and quarrying licences.

Forestry and Soil Conservation Department This Department of the Ministry of Agriculture has expressed interest in supporting reforestation projects in the proposed St Elizabeth EPF Area.

Rural Agricultural Development Agency RADA supports projects aimed at increasing productivity in the rural sector and advocates methods that promote sustainable development. However, limited on-the-ground knowledge and assistance is available.

Port Authority The Port Authority's mandate is to develop and maintain Jamaica's shipping facilities. The Authority should be consulted regarding any new boating and shipping facilities on the coast of the parish.

Fisheries Division Under the Fishing Industry Act of 1976, the Division is empowered to establish fish sanctuaries that incorporate areas critical to the health of fisheries. A fish sanctuary could form an important part of a St Elizabeth Protected Area system. The Division works with local groups to improve the management of resources through provision of guidelines for sustainable net lobster and conch fishing and through a spot check program.

Office of Disaster Preparedness and Emergency Management ODPEM is responsible for preparing Jamaica to deal with emergency situations and reducing the impact of future disasters. With significant fault lines near existing and possible future bauxite red mud lakes, ODPEM needs to assist the Parish Council with disaster planning.

University of the West Indies UWI could play a key role in the monitoring and understanding of the state of terrestrial and marine resource in the parish. The Life Sciences Department is currently monitoring water quality in the Black River system.

Other public agencies considered stakeholders include the Airports Authority, Institute of Jamaica, the Ministry of Local Government and Works, the Ministry of Public Utilities and Transport, and the JDF Coast Guard. Representatives from many of these agencies have contributed to the EPF process.

6 2 Local Management Strategies

The EPF includes a wide range of suggested actions, some requiring coordinated effort from large numbers of people over extensive areas (such as design and implementation of protected areas), others affecting small groups of individuals (such as small-scale craft development). Successful implementation of the EPF will require effective leadership plus the cooperation of local, national and international government and non-government organizations, community and special-interest groups, and businesses.

Issue 71 Perhaps the most important question to be addressed by the EPF is how such a wide assemblage of interests can be brought together to work effectively to review the EPF, to agree on the agenda, and to work towards the achievement of agreed aims in the short- and long-terms

To a great extent the answer depends on the scale and nature of the projects and the resources necessary to undertake them. The first task is to identify an organization that is willing to and capable of providing the leadership to initiate the review and implementation of the EPF document. However, the urgency of many of the projects identified in the EPF is such that they should not be delayed until the completion of the review process. In particular, the following elements call for immediate implementation:

- declaration and establishment of protected areas in
 - the Black River Morass (including both basins),
 - Luana/Font Hill and Parottee, and
 - Cockpit Country,
- development of Black River Town as a national heritage site,
- opening the NRCA regional office at Black River,
- the "Treasure Beach Vision Project," and
- solution of the Appleton dunder problem

It is important that the push towards project development should provide the impetus for organizations to refine and implement the EPF, in order to provide the support systems necessary for success.

In all these endeavors and in broader implementation of the EPF, the most basic requirement is for cooperation and collaboration. The essential elements of a strategy for implementing the EPF include:

- identification of one or more local coordinating bodies or "Local Management Entities" (LMEs),
- identification and nurturing of smaller/newer organizations,
- execution of formal cooperative agreements,
- development of public education and incentive programs, and
- broad-scale participation in policy formulation and planning,

The following sections explore each of these elements of a local environmental management strategy. Principles and guidelines for cooperation are presented at the end of the chapter.

6 2 1 Local Management Entity -- Criteria and Responsibilities

The range and urgency of activities faced by the NRCA and its sister agencies makes partnerships essential. Among these partners are Local Management Entities (LMEs), environmental management organizations that provide the principal points of contact with the NRCA in the general environmental improvement of regions or localities and/or the management of specific protected areas.

An LME may carry out environmental improvement activities with a broad or a specialized focus. Alternatively, it may act as an advocate for the environment and an umbrella representing public, private, NGOs and CBOs. It may nurture smaller or newer NGOs and CBOs, facilitate coordination among them, and provide an interface with other local and national institutions.

The description of LME capabilities and responsibilities in Box 9 below is taken from the NRCA's Protected Areas White Paper and accompanying draft Guidelines for Delegation of Authority to Manage Protected Areas. However, it also applies well to any organization or organizations seeking to become effective guardians and managers of the overall environment of the parish.

BOX 9 FUNCTIONS OF A LOCAL MANAGEMENT ENTITY**The functions of an LME are to**

- attract, manage, disburse and account for funds for environmental protection/improvement projects,
- solicit funding from a variety of donors,
- provide resources to nurture and develop less well established organizations with similar aims,
- provide a forum to respond to local environmental concerns,
- monitor and disseminate information on environmental degradation parish-wide,
- promote public education through workshops, training and outreach programs,
- collaborate with statutory bodies, NGOs and CBOs, on a national and local level,
- link environmental and social initiatives by researching activities that allow people to pursue environmentally sustainable livelihoods
- offer management and oversight of projects to community groups and other small organizations,
- maintain accountable and transparent financial and operational procedures, and
- promote awareness of/compliance with environmental regulations

An LME must have or be able to develop the capacity to fulfil these functions. It must be broadly representative of stakeholder groups and committed to reflecting the opinions of its wide base of support in its management structure and decision making. An LME should also have motivated staff with proven environmental management experience, an appropriate Management Plan and the ability to mobilize volunteer and other local agencies

Whether an independent or an umbrella organization, an LME should be representative of local interests, non-profit and non-political if it seeks delegation of authority from the NRCA to manage a Protected Area. Once delegated, its function is to oversee the management of the Protected Area and the surrounding environment in accordance with stakeholder needs and national policy.

6 2 2 Who can Provide Leadership for EPF Approval and Implementation?

The NRCA provides the overall leadership for EPF approval and implementation, along with one or more appropriate institutions. Candidate organizations that could work with the NRCA are listed above in 6 1 2 and 6 1 3. The best organization will

- have a broad representation of local and national interests,
- be directly involved in sustainable economic development,
- be in a position to provide an impartial overview,
- have a high level of local and national credibility,
- have a good track record for proposal writing, project implementation, management of funds, and
- have experience working with the GOJ, NGOs and businesses to achieve specific environmental goals and mandates

A review of the institutional capacities and track records of organizations suggests that at present the South Coast Resort Board is the best candidate. The proposed new NRCA regional office in Black River will be ideally placed to provide the necessary technical support and could be assisted by SEEPA. In addition, the SCRB could work in conjunction with the Community Development Foundation to develop and implement specific projects and the Malvern Science Resource Centre to produce educational materials.

6 2 3 Who will Implement Specific Projects?**Protected Areas in St Elizabeth (excluding the Cockpit Country)**

The EPF offers the opportunity for stakeholders in St Elizabeth and government agencies to participate in the selection and designation of protected areas in the parish and to consider how such protected areas should be managed. The creation of effective CBOs and NGOs aids the ability of stakeholders to participate in the decision-making process. While the NRCA remains ultimately responsible for all protected areas, it can delegate management authority. Any group, community, NGO or the NRCA can recommend and/or offer to manage protected areas if they fit the criteria set out in the Protected Areas White Paper.

The lack of an agency willing and capable to initiate development of a protected area in Black River was one of the main reasons why there was only limited achievement of the Strategic Interventions in the Environment (SITE) objectives in Black River under USAID's NRCA/DEMO Project. Black River will continue to miss out on some funding opportunities until a strong leader emerges.

Identification of a lead agency to undertake the complex and sensitive task of protected area management will be crucially important. As indicated in Box 9, the responsibilities involve environmental management and monitoring, public education, social development, community outreach, publicity, law enforcement and project development, among many others.

In the immediate future, the NRCA may delegate specific duties as there may be no LME candidate that can undertake all activities relating to the management of an entire protected area. However, an objective of the EPF process is to facilitate examination of management alternatives. The following options exist at present and deserve discussion and review.

- A restructured SEEPA with an expanded mandate and membership,
- A new umbrella organization or an expanded existing organization representing a range of stakeholder interests. The organization would nurture CBOs and act as a forum to coordinate and articulate the concerns of the member groups.¹
- South Coast Resort Board, recognizing the SCRB's broadly representative membership, its management and leadership experience and its accountability. Risks would be the intrinsic

emphasis on tourist-related activities and a greater understanding of physical development than of protection and management of the natural environment.

- A partnership among existing organizations such as SEEPA, South Coast Resort Board, Malvern Science Resource Centre, Community Development Foundation, the Mandeville Weekly whose members would offer environmental management, public education, social development, community outreach and publicity skills,
- the NRCA,
- the Parish Council, or
- A not-for-profit foundation (the South Coast Conservation Foundation/CCAM model) formed specifically as a management entity, assisted by a coalition of GOJ, NGO, community groups and businesses, who work together through management councils that may be formed or dissolved as necessary, and may be organized on a community or thematic basis. For example, there could be a Tourism Management Council, a Fisheries Management Council, Crafts Development Council and Infrastructure Committee, a Treasure Beach Vision Project NGO, etc. The foundation would be responsible for developing and seeking official acceptance for overall policies and implementing major projects. It would also work with or sub-contract community groups to design and implement specific projects identified by communities or by the parish organization. Such an organization has the benefit of greater opportunities for focussing on and succeeding with specific projects and producing cross-fertilization of ideas. However, it risks being impaired by competition and requires many leaders.

¹ This is the model successfully created in Negril, where the Negril Environmental Protection Trust was formed to represent 18 member organizations including the Fishermen's Co-operative, the Craft Vendors' Association, the Chamber of Commerce and the Negril Coral Reef Preservation Society.

Protected Areas - Cockpit Country The Ecosystems Focus Group of NEST has taken the initiative in developing a proposal for GEF funding for a protected area in the Cockpit Country. The proposal covers portions of Manchester, Trelawny, Westmoreland and St. Ann as well as St. Elizabeth. Thus the determination of a lead agency is beyond the

scope of this document. It is recommended that the qualifications listed above should be taken into consideration in the selection of the lead agency and that the South Coast Resort Board should be included in the list of stakeholders who will participate in the design of the project.

6.2.5 Longer-term Options for Overall Management

Most of the project and organizational options presented above depend in some measure on the formation and operation of small community-based organizations and local NGOs. The creation of effective CBOs and NGOs will promote the ability of stakeholders to participate in decisions about projects, environmental management and implementation of other aspects of the EPF and the parish environmental vision. Facilitation for NGO formation could be offered in the form of model structures and legal papers that can easily be adapted by community groups to suit their purposes.

If an overall LME is required, it seems reasonable to suggest that as organizations learn through action and collaboration, an appropriate model will emerge with time. However, decisions about protected area boundaries and classifications should take account of existing and realistic future management options.

6.3 Stakeholder Mobilization

6.3.1 Community Action Program

Stakeholder mobilization needs to be fostered through establishment of a Community Action Program that provides education, orientation and preparation for local Protected Area management. It has been found that public and participatory planning meetings have prompted the spontaneous emergence of community based organizations, especially in communities where a significant proportion of people derive income from natural resources. Such organizations are often motivated by a small quorum of dynamic and responsible people and are generally orientated around a specific resource user group. Funding may be sought from a variety of sources.

6.3.2 Facilitation

Some level of facilitation in meetings and assistance with writing funding proposals is necessary at the initial stages but the facilitators withdraw before the group feels a dependence on outside support. Apart from provision of trained facilitators at the opening meetings, this approach requires relatively little external financing. These groups have a strong incentive to conserve the natural resource base from which their income is derived. This type of intervention builds support from a 'grassroots' level, by linking local concerns and patterns of behavior with wider ecological imperatives. It fosters local perspectives and skills and allows local families to see and feel the benefits of sustainable environmental management. As far as possible, groups are informed by local people from neighboring communities. There has already been successful action in the areas of beekeeping, rafting and broom-making and there is potential for cross-fertilization of ideas regarding craftmaking and agricultural techniques.

6.3.3 Promotion of Indigenous Skills

The NRCA and/or local environment management entity should promote links between groups with indigenous skills so that local expertise can be used in training initiatives in other communities. Once established, these local organizations can fit into the institutional framework provided by the local NGO or Protected Area's LME. By building on local expertise, this system of management ensures a degree of sustainability that is less easily attained under more traditional centralized regimes.

6.3.4 Gender Factors in Natural Resource Management

Gender factors play a significant role in natural resource management. Women's participation in managing environmental improvement projects should be encouraged. Women have extensive knowledge of their environment and many depend on natural specific resources in order to meet livelihood needs. At the same time, a similar sensitivity to issues of sustainability needs to be fostered in men who traditionally harvest the resources used and sold by women.

6.3.5 Sources and Types of Support for Organizational Development

There are numerous sources of funding, training and technical support for these organizations and groups. This goal cannot be realized without the support of a Local Management Entity which in turn needs the input and support of smaller local groups.

NRCA – Decentralization and Opportunities for Institutional Strengthening The NRCA's plan for decentralization is intended to bring the agency closer to the sources of environmental problems and the means of monitoring and solving those problems. Effective decentralization will rely on effective partnerships with the Parish Council and local environmental organizations. The NRCA relies on NEST to assist in strengthening nascent LME and other local groups.

NEST – The National Environmental Societies Trust also offers training, advocacy and information services to member NGOs and CBOs involved in environmental management. When a member organization reaches a degree of maturity, NEST will provide assistance with strategic planning and other critical aspects of organizational development.

Funding Sources Potential donor agencies for small projects include

- at the local level, the Social Development Commission and the Community Development Foundation,
- at the national level, the Environmental Foundation of Jamaica and the Jamaica Social Investment Fund, and
- at the international level, the Gender Equity Fund and Canadian Green Fund through the Canadian Cooperation Office, the European Union, and the United Nations agencies.

Private Sector Support Private sector involvement in environmental improvement initiatives has been limited to date but would have significant local impact as well as goodwill and marketing benefits. Potential supporters include hoteliers, tour boat operators, Appleton,

Black River Ice Factory and the mining corporations.

Government Agency Support There is a need for more inter-agency collaboration on social/environmental issues. Several agencies are now involved in assisting poor local communities in addressing their immediate needs through skills training and development projects. Others are active in support of environmentally sustainable agriculture, development and tourism and in the protection of public health.

Social Development Commission. The SDC offers support to communities in writing and submitting funding proposals through programs such as the Special Training and Empowerment Programme and the Integrated Community Development Programme. This form of skill promotion should be encouraged so that communities benefit from external support in their environmental management schemes.

Local Government Reform Unit. The LGRU are presently conducting a series of participatory community needs assessments in several parishes under the national Poverty Eradication Programme. Communities are being taught ways to examine their practical and strategic needs.

Tourism Product Development Company Conservation of St Elizabeth's environment relates directly to the quality of the tourism experience, for which TPDCo is statutorily responsible. TPDCo is sponsoring infrastructure projects designed to support community-based tourism through the South Coast Resort Board and has indicated a strong interest in working with the NRCA.

Forestry and Soil Conservation Department This Department of the Ministry of Agriculture has expressed interest in supporting reforestation projects in the proposed St Elizabeth EPF Area.

Rural Agricultural Development Agency RADA supports projects aimed at increasing productivity in the rural sector and advocates methods that promote sustainable development.

Planning Institute of Jamaica. PIOJ is responsible for producing a current Development Order to inform Local Government policy and guide development throughout the Parish. Collaboration between NRCA and the Institute may contribute to policies that reduce environmental degradation.

National Water Commission. The NWC relies on the environmental integrity of the watershed, in order to provide water to the population. Cooperation in the areas of water quality and sanitation is important.

Water Resources Authority. The WRA may assist in the coordination of activities for watershed protection and water conservation.

Ministry of Health. The Environmental Control Division's field officers enforce and monitor environmental health standards and can provide technical advice.

6.4 Other Critical Elements of a Management Strategy

6.4.1 Cooperative Agreements, Memoranda of Understanding

Partnerships are required to encourage dialogue and consensus on issues affecting stakeholders, to promote appropriate environmental management and to limit existing pollution sources. The process of establishing Cooperative Agreements delineates the respective responsibilities of the parties and formalizes environmental protection arrangements. The strategy relies on showing the actors that they have a common interest in maintaining the natural balance of the ecosystem upon which their livelihoods are based. It is essential to ensure, as the EPF aims to do, that the parties understand their position within the wider ecosystem and that the agreements address incentives for environmental protection. A Cooperative Agreement among the three agencies would increase coordination and integration of policies.

A suggested model cooperative agreement is provided in Annex I, together with an outline of possible agreements.

6.4.2 Environmental Education

The attention of the National Environmental Education Committee (NEEC) is drawn to the need for environmental education in St Elizabeth. The need for broad education and promotional campaigns at the adult level was demonstrated by the Environmental Awareness Survey. However, as the survey also suggested, the most effective environmental education at this level is likely to occur through the understanding and solution of problems that affect economic self interest. Most participants in the process to date have stressed the critical importance of working with schools to effect fundamental changes in environmental awareness, attitudes and behavior.

6.4.3 Policy Formulation and Planning

Formulation of effective policy and plans, regardless of subject, requires broad participation. The planning process must set out alternatives so that participants can select or modify one that best meets a range of interests. Policy should create incentives for people to choose to act in the interests of the environment. This kind of policy will be most likely to emerge from collaboration within the spectrum of institutions with mandates relating to environmental protection.

Effective and open communication and community participation is vital to a broadly beneficial planning process. Approaches to community involvement need to recognize the potential for local people to act as responsible managers of the environment. Greater reliance on PVOs and NGOs to integrate environmental concerns into projects and community development activities will promote a flexible and locally driven management strategy. It will also promote representative participation in planning sustainable development.

6 5 Framework for Implementation

6 5 1 Appropriate and Sustainable Development

Throughout the EPF, there has been ample evidence of the need for several critical changes to ensure that future development is appropriate and sustainable

Environmental Ethics There is a need for more ethical behavior towards the environment and natural resources at all levels of society It is clearly in society's interest to see the elimination of abuses against common and private natural resources Attention is frequently drawn to fishing with dynamite and spearguns, the slaughter of turtles, and praedial larceny, abuses practiced by "small people " Less attention is given to the larger-scale and more blatant pillage of common resources represented by illegal sandmining, limestone quarrying and systematic logging operations practiced by "big men " At an even higher level, the practices of several private companies and corporations continue to set the environment and human health at risk

In all cases, greed and lack of conscience must be assumed by now to play as big a role in such behavior as lack of knowledge Such practices are effectively condoned by the lack of monitoring and by the lack of will to prosecute or impose effective penalties Such practices will continue as long as the general public does not demand a return to respect for nature and for common resources

Community Management A change in ethics is beginning to be seen in areas where broad-based local environmental management entities have become established and member groups and organizations are nurtured and encouraged to play roles in community management That change needs to be reinforced by formal procedures for co-management, more open lines of communication and opportunities for community participation in a wide array of planning decisions

Precautionary Principle At present the national system of project and environmental review tends to place the burden on the lead review and approval agency to determine whether a proposed project has the potential to adversely affect the environment The precautionary principle calls on the proponent to take the steps necessary to determine at the outset of planning whether the proposed site and the proposed use are environmentally compatible, free from hazards and sustainable

6 5 2 Project Identification, Review and Assessment

The following modifications to the current system are recommended and would take Jamaica in the direction followed in many other countries

Full and Early Disclosure This element places responsibility on both the proponent and the lead review and approval agency

Proponents, including government agencies, need to reveal proposed projects openly and early enough for broad comment on and assistance with their plans Lead agencies and other public agencies need to make information readily available that will guide the proponent in the selection of an appropriate site and/or project Ideally, the NRCA and other regulatory agencies would establish "counters" and encourage early enquiries

Under the anticipated departure from an "Official Secrets" era into a "Freedom of Information" era, a system needs to be created that ensures broad public debate before decisions have, de facto, been made by virtue of the proponent's investment

Public Participation and Debate Sustainable development requires early consultation with those with an interest in a particular area, a particular resource or a particular project type There is evidence of a growing awareness on the part of the general public of the need to voice concerns about proposed projects At present, public hearings are held when most decisions have been made and are insufficiently publicized (A case in point is the recent hearing on the proposed Whitehouse

Beaches hotel, to which even organizations such as TPDCo and the South Coast Resort Board, were not invited) In addition such hearings are not routinely reported in the media As a result, there is a potential for frustration, lack of trust and either an adversarial atmosphere or increased apathy

The Permit and Licence system aims to initiate dialogue on projects at the outset of the planning process by requiring the proponent to complete a Project Information Form (PIF) The NRCA recognizes the need for modifications to the system as experience is accumulated (In other countries, such changes are often achieved through litigation Ideally, that costly and time-consuming route can be avoided in Jamaica) It is recommended that to be more effective, a simplified PIF would be less burdensome for the proponent and more informative of the public and other agencies

The process offers a second opportunity for relatively early dialogue when Terms of Reference (TORs) are prepared to guide the preparation of an Environmental Impact Assessment The U S and various other countries require the TORs to be reviewed at a public "Scoping" meeting This meeting allows the public and other agencies to comment on the nature of the proposed project and to participate in identification of the alternatives (alternative sites, project scales, and project types) to be described and analyzed in order to allow both the public and the proponent adequate opportunity to be sure about the appropriateness of the final project

If the PIF and Scoping sessions were to be widely advertized and distributed, this approach would encourage achievement of "win-win" projects, shortening planning and review time and helping to assure a more cost-effective and profitable project It would require a more proactive approach on the part of reviewing agencies, with more time in early consultation substituting for lengthy desk review of final documents

6 5 3 Community Participation in Monitoring

Other countries have discovered that a shortcoming of the environmental review system is the difficulty of monitoring implementation of measures required by the terms of project approval to avoid or mitigate adverse impacts Local environmental management entities and community groups can play a significant role in project monitoring and thus augment the capacity of the NRCA and other regulatory agencies

Local environmental and community groups can also perform important functions in monitoring their areas They may report illegal activities and participate in ongoing recording of the presence and abundance of species Again, they have a substantial role to play in supplementing the capacity of the NRCA and others

6 5 4 Mechanisms for Cooperation and Transparency

Whether or not the parish opts for an overall Local Management Entity, it might consider the establishment of a coordinating committee to give greater assurance of coordination among agencies, early disclosure of policy and project proposals, and maximized use of funding, training and other support opportunities Possible membership might include the Parish Council, the South Coast Resort Board, SEEPa, CDF, SDC, NRCA, WRA, FSCD, RADA, TPDCo and, at least on an interim basis, LGRU

6 5 5 Statement of Commitment to Cooperative and Sustainable Action

During the review of this draft EPF, the NRCA hopes that the varied agencies and interest groups identified in this document will come together to make a statement of their commitment to work together to achieve a sustainable future for St Elizabeth It is hoped that the following principles of institutional, organizational and personal cooperation will be helpful to this process

6 6 Principles of Cooperation

6 6 1 The Need for Partnerships

The development of any country of community involves persons from all walks of life, that is, persons pursuing all different career paths. However, society generally does not permit individuals to pursue their individual goals at the expense of other members of society. Societies therefore create social arrangements to ensure their orderly development. Within this context, it is normal for partnerships to be formed between two or more entities for the pursuit of economic goals. Although less frequent, partnerships have been formed for the pursuit of specific social objectives.

Such partnerships occur between and among individuals, organizations, groups, and even entire communities. Partnerships are required to

- facilitate dialogue and consensus on issues affecting communities,
- participate in determining the best options for development,
- allow for sharing of the costs and benefits of development, and
- maintain and strengthen community bonds.

The individuals and institutions participating in this EPF process do not have the same resources, size, authority, or power. However, all are equally critical to the process. It is therefore essential to find assistance with organizing the newer and smaller groups and accessing the resources required to support their acknowledged roles. This is especially true of community groups.

6 6 2 The Need for Community Action and Support.

Communities within the EPF area still depend on government or some large organization to provide them with the basic necessities for individual and community development. There are very few cases in which communities have developed strong independent and sustained programs of community action. Yet, the resource base on which many of

these communities depend is being severely degraded by their own actions as well as by the actions of external operators. In fact, the very health of several of these communities is at risk. Community action is therefore required in the following areas:

- Identification and protection of areas/resources critical to community development,
- Enhancement of resource base and/or surrounding environment,
- Development of support systems for internal development (leadership and skills training, labor sharing, etc),
- Negotiation with GOJ and other external organizations about the use of community resources and distribution of benefits from that use,
- Negotiation with government for the development of adequate social infrastructure, and
- More active participation in the socio-political process, especially with respect to community development.

These actions will depend on the support of both community and external actors, resources and mechanisms including

- Timely access to information on development plans, appropriate technologies, conservation practices, investment potentials etc ,
- Technical support for project development and implementation,
- A sustainable program of skills development,
- Development of cottage industries that support other linkages in the local economy,
- Mechanisms for input to development planning (LACs, service clubs, attendance at parish council meetings, joining ENGOs),
- Development of policies for public access to information, as well as program development and implementation, and
- Improved delivery of social services.

6.6.3 Principles for Cooperation

By participating in this EPF process, the Government of Jamaica and other participants reaffirm their belief that development can only take place with the full and willing participation of all sectors of society. It also confirms their commitment to the process of sustainable development and the principles and guidelines shown in the following box, a commitment shared by

- Individuals,
- Community-based organizations and other civic groups,
- Private sector organizations and interests,
- Local Government, and
- Central Government agencies

In supporting the EPF the participants agree to

- Support the intent of the EPF,
- Use its guiding principles in the development and implementation of their individual (person, organization, or community) programs and actions,
- Share their resources and skills for the attainment of EPF objectives where possible,
- Share information freely with other participants,
- Use agreed mechanisms for resolution of disputes, and
- Support the maintenance of the EPF process

These general agreements and principles apply to the actions of individuals and organizations, including

- Income generating activities,
- Resource allocation (physical, sectoral, economic planning),
- Development control and permitting,
- Environmental planning and management, and
- Solution of existing or future problems

6.6.4 Possible Mechanisms for Cooperation

A variety of approaches to public participation in public decision making have been applied in the past. However, less effort has been applied to developing long-term cooperative efforts between public and community organizations. Cooperative arrangements must support not only implementation of specific actions, but also the sustainability of the EPF process and may cover

- Environmental restoration actions
- Environmental improvement actions
- Sustainable resource use actions
- Environmental management programs
- Public awareness and information support
- Research and development
- Monitoring and enforcement

Such arrangements may be specific in terms of time, action and/or program or fairly general. There may be no limit on the number of partners to each agreement but the role(s) and conditions(s) under which each participates should be clearly stated where possible.

Possible mechanisms for broad-based cooperation include

- Establishment of a local coordinating/advisory committee for the EPF process,
- Expansion of the role of the Parish Advisory Committee of the St Elizabeth Parish Council,
- Community involvement under NRCA's Permit and Licence system,
- Local advisory committees for the protected areas,
- Cooperation on a project by project basis, and/or
- Establishment of a local advisory committee for the Black River Watershed Management Unit

These mechanisms are not mutually exclusive and a mix of mechanisms may be required to support the process.

BOX 10 PRINCIPLES AND GUIDELINES FOR ACHIEVEMENT OF SUSTAINABLE DEVELOPMENT AND EPF OBJECTIVES**Principle # 1 Sustainable Development**

All actions should be undertaken in way that improves the quality of life of affected citizens, promote sustainability of the development process, ensure the integrity of the resource base and ecological processes, and be based on the principles of equity and justice

The following specific guidelines should apply

- The general public and representatives of civic, private and public sector groups should be invited to participate in all activities affecting their lives, especially where interest has been expressed in general or specific terms. Where participation mechanisms do not exist, the interests involved will develop mechanisms appropriate to the occasion
- In designing and implementing development activity, the Precautionary Principle should be followed
- Development activity should be subjected to early review as well as environment impact assessment
- All actions should be thought through to minimize waste production
- All actions should be carried out in such a manner as to protect the ecological integrity of the affected ecosystems
- The principles of equity and justice embodied in a system of environmental activities should guide all our actions

Principle # 2 Accountability

Partners in this EPF process must be accountable to each other as well as the public in general. Appropriate means of consultation/accounting must be developed for programme development, implementation and reporting

The following guidelines apply

- There must be transparency in all actions,
- The public should have access to information and inputs to projects, as long as trade secrets and organization security is not compromised,

- Participants in the EPF process, especially affected parties/communities, should be consulted at all stages of implementation of programs

Appropriate means of reporting must be devised to inform participants of progress in the implementation of the agreed actions

Principle # 3 Maintenance of the EPF Process

Participants must work to maintain the EPF process as a means of integrating the plans and actions of the different individuals/groups involved in the development process in St Elizabeth and the remainder of the EPF area

The following guidelines apply

- Participants should adhere to the guiding principles
- Participants should actively seek to share information and plans, and strive to develop and strengthen cooperative arrangements
- Participants should develop and participate in an EPF review process

Principle # 4 Dispute Resolution

Issues of competing use of resources and the resolution of differences should be addressed using agreed dispute resolution mechanisms

The following specific guidelines apply

- All participants are to be treated with respect,
- Agreed planning, consultation, and dispute resolution procedures should be followed without closing any option,
- Where such mechanisms fail to resolve issues, the dispute resolution mechanisms of civic society will be used,
- Participants of this EPF process will not support actions creating

CONCLUDING STATEMENT The Natural Resources Conservation Authority recognizes the need for more in-depth collaborative arrangements in the efforts to ensure a sustainable development path for Jamaica. We therefore invite the full participation of other agencies of government in this process of environmental management in St Elizabeth, and we hope the objectives set out in this document can be realized in the near future.

VOLUME 2

7 PRIORITY ACTIONS

7.1 Introduction

Experience in St Elizabeth and other communities throughout the island suggests that awakening environmental consciousness and stirring persons to action requires a twofold approach. One approach involves garnering wider support through organizations and established institutions in an encompassing top-down approach. The other seeks to demonstrate that environmental issues have a direct bearing on residents' daily lives. This bottom-up approach should lead to projects that impact directly on the resource users, whether they operate on a subsistence basis or not, helping to raise consciousness and encourage the emergence of leaders. This EPF process has used both approaches and both need to continue.

Chapters 1-6 (Volume 1) of the Draft EPF have presented information about resources, threats, ideas for solving problems and an assessment of organizational capacity to participate in those solutions. This second volume describes the actions, in outline or in detail, that have been identified to date to move the EPF process from paper to reality. All stakeholders in the future of St Elizabeth need to make a commitment to actions to remedy or deter the immediate and longer-term threats to its environment, including

- a Consensus among responsible entities regarding priorities and approaches
- b Development of environmental policies necessary to protect critical resources and areas which support sustainable development (such as the use of wetlands, land management practices, waste disposal technologies for use in the area, etc.)
- c Development of coordinated approaches to data collection and planning, or, at a minimum, sharing of information. (Areas of interest include water quality, land use, socioeconomic impacts of resource extraction, etc.)

- d Development of cooperative management arrangements among government agencies, non-government organizations, and private interests for planning and conservation efforts (especially in the areas of protected areas, ecotourism and watershed management)
- e Incentives, guidelines, and other tools to promote voluntary compliance with development and resource use laws, regulations, standards and best practices

After the required internal reviews, the document will be sent to local groups and government agencies for review and subsequent discussions. The projected timetable for completing the EPF development process, and reaching agreement on the cooperative agreements with the other government agencies is November 1998.

7.2 Proposed Protected Areas

7.2.1 The Black River Morass

In collaboration with stakeholders, the NRCA's Black River Team has progressed towards the goal of declaring the first protected areas for St Elizabeth. Annex C contains the NRCA's analysis of conditions, its preliminary recommendation that the Black River Upper and Lower Morass be made a Managed Resource Protected Area, and the area's tentative boundaries.

The NRCA is also recommending declaration of a Protected Areas (classification as yet undetermined) along the Font Hill Coast. Consideration will also be given to the Parrottee coast which was, together with Luana-Font Hill, recommended by JCDT for inclusion in the Black River Lower Morass Protected Area.

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7 2 2 Declaring and Managing Protected Areas

In reviewing this EPF, all stakeholders in St Elizabeth and the Government of Jamaica are encouraged to comment on and participate in the designation of the Protected Areas. Any group, community, NGO or government agency, including the NRCA, can propose other protected areas provided that they meet the IUCN criteria (presented in Table 5 in Chapter 2) and may apply for delegation of management or co-management authority. Readers should consult Table 3 in Chapter 2 and Annex A for lists of prior protected area recommendations.

7 3 Legislation, Regulations and Enforcement

7 3 1 Inter-Agency Consultation Process

The inter-agency consultation process is aimed at the national planning agencies, planning departments of ministries, and other institutions that have an interest in St Elizabeth. The purpose of the consultation is to share information and plans, develop consultative processes, and eventually to develop agreements relating to specific programs and actions of the collaborating institutions. Consultation is at the heart of the Framework for Implementation and the Principles of Cooperation set forth in Sections 6 5 and 6 6. The ultimate goal is improved environmental management in support of national objectives and an improved quality of life for the people of St Elizabeth.

7 3 2 Recommended Regulatory/Legislative Changes

Protected Areas As indicated in Table 5, six types of Protected Areas have been identified as having relevance for Jamaica. Regulations exist for national and marine parks. Draft regulations have recently been prepared for the remaining types.

Beach Policy In addition to the proposals of the Beach Policy Green Paper for public access to beaches, attention needs to be given

to whether all beaches should be "developed." There is a need for a variety of beaches to minimize conflicts between fishing and bathing at beaches such as Calabash Bay and Great Bay, to provide undisturbed turtle nesting, protect other important habitat and offer quiet, natural beaches for walking and observing nature.

Mining Act This EPF draws attention to the need for a national review of the Mining Act established originally as a wartime emergency measure. Future bauxite mining operations should be considered in the context of the relative immediate and sustainable value and environmental impacts of mining versus other natural resource uses in a given area.

- The Government's recently announced initiative to address the social impacts of bauxite mining needs to be expanded with a comprehensive study of the relative suitability of bauxite reserves (especially on Crown and JBI lands) for mining, considering other competing resources and values.
- Changes in the Mines and Quarries Act that have reduced NRCA's role in the approval process for mines and quarries should be reversed.
- The approval process should require assessment of the loss of options as a result of mining.

Idle Lands The EPF also draws attention to the need for a review of the Idle Lands law and what constitutes "productive use." Ideally, the penalties under this Act should be applied only after a review of the intrinsic value of the lands in question. Lands with high biodiversity value and/or fragility should be retained in their natural state. Many private owners protect forests and should be recognized for doing so rather than penalized. Consideration should be given to creating incentives for owners of such lands to retain them in their natural state or endeavor to enhance their condition rather than impose penalties for non-use.

A model that might be followed is that of the forgiveness of a portion of land tax in return for entering into a contract with

Government agreeing to retain the land in its current use for ten years

Wild Life Protection Act Penalties for destroying or harming endangered species and/or habitat should be increased. Consideration needs to be given to increasing the penalties for killing or harming endangered species. For example, a \$2,000.00 fine imposed in 1997 for the slaughter of a 200 lb sea turtle near Black River with a large number of eggs was less than the sale value of the meat,

- An education/PR campaign is needed to remind residents and visitors, and especially the young, about traditional sustainable harvesting methods such as taking a few eggs for food, leaving a majority to hatch,
- Measures are urgently needed to protect remaining high value turtle-nesting beaches. For example, the Beaches Hotel at Whitehouse is to be constructed on one of these beaches and changes to Font Hill beach may conflict with its value as a nesting ground. By contrast, a beach at Billy's Bay is being donated to the nation for the purpose of protecting turtles.

Fishing Regulation is needed to control the use of blocking gear such as large gill nets or weirs that block access to inner waterways. Further regulation of damaging practices, including spearfishing and dynamiting, with stiffer penalties, would strengthen needed efforts to develop self-policing among the fishing community.

Bird Hunting Bird hunting is prohibited in Protected Areas and declaration of protected areas in the near future will assist in the protection of hunted species. However, consideration should be given to preparing an assessment of the extent and effect of bird hunting, updating of current laws and regulations, and whether a short-term moratorium is called for.

7.3.3 Advanced Guidance and Improved Impact Assessment

Early Project Guidance The NRCA is developing the capacity to provide earlier guidance to developers, landowners and other prospective project sponsors. The advantages of this approach may include improved locational decisions, improved precise siting of development, decreased impacts, increased project value and lowered costs for review and construction. Establishment of information counters is recommended (see Section 6.5.2).

The Parish Council will increasingly participate in providing guidance and will need access to both information and training.

Environmental Impact Assessments A more comprehensive and integrated view of EIAs is important to avoid future inappropriate project decisions.

Penalties for Illegal Development and Operations Information about development suitability and the Permit and Licence process is becoming more available and sites are being provided to replace and prevent clandestine developments and squatter settlements. Consideration now needs to be given to increasing and formalizing policies for illegal development activities, such as land capture and opening attractions without permits and licences.

Monitoring Greater public awareness of the environment will support improved monitoring of both approved development, to ensure that required mitigation measures are included, and illegal activities.

7.3.4 Needed Improvements in Enforcement

There has been discussion for several years of providing environmental training for the Police and the Judiciary. The need is growing more urgent and the basis of knowledge and regulation, together with experience of inappropriate sentencing, now exist to support effective training programs.

7 4 Priority Improvement Actions

Government, private sector, NGO and community groups will all have roles to play in an effective program of priority improvement actions. The following are the critical steps in developing a successful program.

7 4 1 Coordinating Committee

As indicated in Chapter 6, it may be some time before local organizations develop the capacity to manage the environment of the large and complex parish. The NRCA will play a critical role in coordinating government and private activities through the consultation process and the Permit and Licence system with other government agencies. However, it may be desirable in the short term to establish a Coordinating Committee to oversee implementation of the EPF.

7 4 2 Feasibility Studies

The selection, design, coordination and implementation of projects within Protected Areas will be guided by the management plans for those areas. Elsewhere, many of the priority projects will require feasibility studies and project designs before funding can be obtained. These feasibility studies will provide the opportunities for ensuring that projects are properly coordinated and mutually reinforcing. The review of project proposals and feasibility studies might be spearheaded by the South Coast Resort Board or an EPF Coordinating Committee, should one be established.

7 4 3 Project Funding

A number of funding sources have indicated interest and willingness to fund appropriate priority projects. These include the Community Development Foundation, an EFJ-funded revolving fund, the Social Development Commission, the Social Investment Fund and the EFJ itself.

7 4 4 Skills Links

The design and implementation of projects will require the sharing of skills. A range of specific skills are already available, as described in Chapter 6. In addition, the NRCA and NEST can provide guidance with the preparation of proposals and the development of organizations capacity.

7 4 5 Infrastructure

Government support for improved and more sustainable infrastructure will help the residents of St Elizabeth to become more effective managers of the environment.

Water With the initiation of the Hounslow irrigation scheme, some relief is in sight for farmers affected by severe drought. However, as discussed in Sections 3 8 2 and 4 1 3 (page 97), larger-scale proposals, especially if they involve the Black River system, should be resisted in favor of education/reeducation in drought-adapted agriculture, rainwater capture and conservation techniques.

Farm Roads Improved farm roads are critically needed throughout the parish, for farmers, residents of rural communities and the type of travel and community tourism favored in the parish. Road improvements are, in turn, critical to national economic health but traditionally improvement decisions have been politicized.

Railroad As described in Section 3 8 1, the Appleton Estate Tour train had significant benefits for a significant portion of the parish and for tourism in St Elizabeth. Permission to operate should be renewed. In addition, the absence of a national railroad system places huge burdens on the road network. Heavy cargo that could and, preferably should, be transported by rail, clogs roads, slows traffic, accelerates the need for road repairs and may deter vacation travelers who could otherwise travel, and spend, throughout the parish and the country. The need for renewed efforts to restart the railroad system is serious and urgent.

Utilities Imported energy has a huge impact on the well being of the economy and the citizens of Jamaica. Alternative energy sources may be locally and globally destructive (the use of natural forests for fuel and charcoal) or beneficial (solar, wind, hydro, etc.). In the short term, fuelwood plantations may relieve some pressure on natural forests. Reimposition of the kerosene subsidy would also be a desirable short-term measure. However, more appropriate non-polluting alternatives need to be encouraged so that increased demand can build commercial opportunities and reduce costs.

7.5 Proposed Sustainable Resource Use Projects

One of the most effective ways to protect plant, bird and marine species, mitigate environmental impacts and conserve biodiversity is through encouragement of sustainable and profitable resource use projects. The following section suggests potential pilot projects based on conservation and outlines areas that require research.

7.5.1 Sustainable Shrimp and Fisheries Activities

Shrimp Fishing Ecotourism opportunities associated with shrimp fishing should be explored and exploited. Guided canoe and/or walking tours at one of the canoe-launching points could be associated with a display on the history of shrimp fishing, traditional sustainable practices, the life history of shrimp, traditional crafts (baskets and canoes) and possibly with the sale of shrimp. This alternative income source could assist fishermen who are deprived of income by the problems associated with water pollution and help to discourage young men from harvesting shrimp unsustainably.

Shrimp Processing In 1997, with the help of the NRCA, higgler at Coopers Corner in Middle Quarters began experimenting with a solar oven for the purpose of dehydrating shrimp. The aim was to provide the higgler with an income during the closed period for shrimp, supporting a return to sustainable fishing practices. A feasibility study should examine this and other approaches to processing shrimp, including the environmental impact, cost-benefit ratio, marketing, waste management, and effects on social relations

between female higgler and male fishermen (see Annex H).

Shrimp Farming A study of the biology of shrimp is required to determine opportunities for habitat management. Several potential sites have been identified for shrimp farming to supplement the diminishing supply of river shrimp both to support the fishermen and the higgler to whom they sell. Small-scale activities may be the most appropriate but a feasibility study (as above) is necessary prior to any proposal or project.

Fish Farms As indicated above, the potential for aquaculture projects exists within the Morass at Punches, Frenchmans and elsewhere. However, there are a number of abandoned fish farms in the Morass and the reasons for failure should be investigated. Where possible old sites should be reused to minimize further disturbance of the Morass. Further research into the environmental impact of effluent is necessary and guidelines on acceptable parameters for the discharge should be written and applied to the farms. Construction of a biodigester may reduce pollution from the waste from fish processing. Aquaculture has contributed financially to the construction of a biodigester at Elim Agricultural College, which provides cooking gas to the kitchen and regularly disposes of a proportion of the company's waste fish carcass there. Such initiatives should be encouraged.

Oyster, Clam, Crab, Conch, Turtle, Lobster and Irish Moss Cultivation The potential for mariculture exists on the coast at Great Bay, Parottee and Galleon Beach. Cultivation of Irish Moss, Lobster and Crab appear the most viable, the latter being seen as the most sustainable in ecological terms. Small-scale, community-based operations may be most appropriate, but technical clarification of the issues involved is necessary.

Tour Guiding Each of these operations could provide the basis for community tourism and interpretive opportunities and offer additional income sources to relieve pressure on natural fish stocks. Fishermen could also be trained as lifeguards on beaches, such as Parottee, that have none.

7 5 2 Improvement in Craft and Marketing

Thatch Palm Cultivation In the Black River Lower Morass several groups of women derive their livelihoods from the use of sable palm fronds. The products they weave are part of an integrated and complex set of traditional activities that support the income of several small-scale subsistence families. They include baskets for shrimpers, fishpots for fishermen and more decorative craft for the tourist market. The sable or thatch palm is becoming scarce and less accessible, affected by overuse and by destruction by cattle. The viability of the crafts is also threatened because the men who harvest the fronds in the morass now charge for doing so, while payment and access to markets are controlled by middlemen.

Conservation will be best practiced through training in sustainable Sable or Royal Palm cultivation for specific groups for whom use of palm products is an important livelihood strategy. Potential sites exist in Vineyard, Slipe and Great Bay. In Vineyard, a group of women wishes to organize itself as a formal CBO and has identified a Thatch Reserve area. If thatch seedlings can be produced economically and cultivated easily, crafters could benefit from a program enabling them to raise thatch in their own yards. Unused government land could be used for community thatch supplies if an effective management system is developed (see Annex H).

Basketry, Woodcarving and other Handicrafts An improvement in the quality of the finished product is necessary to compete on the wider market. However, decentralized skills centers and a centralized local marketing operation would help communities to realize the full potential of this industry. Intervention could build on the initiatives of SDC in Mountainside and Operation PRIDE in Vineyard. The vision includes encouragement of a greater variety of crafts. These could include furniture with basket weave insets, hand decorated items (furniture, tiles, fabrics), clay tiles, pots and models, tie-dye and batik using local natural dyes, weaving using locally grown cotton, and simple, fashionable resort wear using local motifs. A traditional dye center and logwood museum could be established where natural dyes would be used to make goods for

sale, and their history illustrated. Where possible local production centers would be open to visitors as living museums with shops.

7 5 3 Other Resource-based Opportunities

Natural Pharmaceutical and Cosmetic Products Several local sources of knowledge and supply of effective natural pharmaceutical, toiletry and cosmetic products have been identified. Developing and marketing the potential needs specialist opinion.

Beekeeping Areas where Logwood and black mangrove trees are plentiful are suitable for producing high quality honey.

7 5 4 Nature Tourism and Community/Heritage/Cultural Tourism Opportunities

Water-Related Small-Scale Tourism Several local ecotourism operations enjoy national success and there is great potential for additional sustainable tourism initiatives. The shrimp, mariculture and craft activities described above provide a strong basis for community, heritage and nature tourism. Guided birdwatching and wildlife watching tours could be offered at a number of beaches, especially at Great Bay, Great Pedro Pond, Parottee, Galleon Beach and Font Hill. Treasure Beach fishermen take occasional visitors up the Black River. With appropriate training, these and other coastal fishermen could provide guided tours and water taxi operations along the coast as a welcome alternative to the Black River trip. Guided birdwatching tours on the river system by canoe or small engine boat would offer another alternative to "safari" tours. Shrimp fishermen could provide canoe tours of the river system. Several possible sites and sources of local skills have been identified in the Vineyard and Slipe areas for rafting ventures. However, development of future activities should take place within a coordinated framework to minimize impacts, reduce dilution of the market by "copy-cat" operations and ensure that many areas are left undisturbed. In particular, permits for rafting and other activities in the Black River Morass should be based on further examination of the carrying capacity of the area.

Other Opportunities In addition to guided and/or self-guided nature trails, development of attractions at Font Hill could include blinds, interpretive displays, cabins, orchid cultivation and, as proposed several times in the past, crocodile farming. Numerous routes for walking, hiking, biking, riding and mule-pack tours exist, especially along the roads, rivers, streams and cliffs of the southeastern portion of the parish. These offer opportunities for outfitting and guiding businesses for local landowners, farmers and others. The proposed pack trip down Lovers' Leap is an example. The South Coast Resort Board might invite operators of Valley Hikes in Portland, a business that employs local farmers as guides in the Rio Grande Valley, to present a history of their operation.

There is potential for bird sanctuaries in Vineyard, Maggoty and Great Bay all of which are suitable areas for both conservation and ecotourism. The latter area is particularly suitable because of the ponds and proximity to other tourism attractions.

Small Scale Ecotourism The development of tourist attractions could also include visits to interpretive centers such as the dye center suggested above. Shrimp fishing is another prime candidate. Displays providing information on the shrimp and its life cycle and live or audio-visual presentations about traditional sustainable harvesting practices could be followed by canoe trips. All of the following activities have potential for similar interpretive centers.

7 6 Private Sector Opportunities

7 6 1 Design of a Marketing and Reservation System

An opportunity exists for establishment of a local private sector organization to provide support services for attraction owners and owners of small accommodations. Such an organization could work with the Parish Council, NGOs and Protected Areas management organizations, running a system of reservations and assisting with marketing the St. Elizabeth network of attractions and activities. This organization would also manage marketing and reservations for villas, guesthouses and Bed & Breakfasts (see Section 5 2).

7 6 2 Sustainable Practices Incentives

Consideration needs to be given to providing incentives to private business and land owners to change to sustainable practices. As the system of property taxation becomes more efficient, programs that provide tax adjustments in return for good land management it will become more attractive. Such incentives should accompany any modification in the idle lands policy to encourage private landowners to protect valuable natural landscapes. The greatest concessions should be available in the form of Conservation Easements to owners who commit to retaining their land in a natural state in perpetuity.

Another approach will be the provision of information and training on cost-saving sustainable practices. For example, a conference to promote greening of all hotels and villas might be organized, perhaps by the Resort Board. Funding could be sought from the EFJ. Alternatively, an expansion of the USAID Environmentally Sustainable Tourism (EAST) Program might be requested.

7 6 3 Types of Commercial Activities Compatible with Proposed Protected Area Zones

Ecotourism YS Falls is a good example of responsible private operation of a natural feature as an ecotourism attraction within or adjacent to a proposed protected area. Many other potential opportunities exist in the parish. In addition, many of the ideas for guided tours, outfitting and boat tours offer opportunities for private landowners or private business interests and would also offer much-needed employment to local residents.

Agro-forestry Both the Forestry Department and RADA have expressed interest in supporting agro-forestry projects in the Lower Morass. Fruit trees represent a food stock (especially important during periods of seasonal stress) for the poorer sections of society (e.g. ackee, breadfruit and mango) and a viable commercial activity for the more affluent (papaya and exotic fruit).

Solar Ovens The Malvern Science Resource Centre is distributing information about solar cookers to reduce the environmental costs of charcoal and woodburning. Two solar ovens were made by a local craftsman for experimental use by Middle Quarters shrimp hugglers. The potential would appear to exist for construction and marketing of inexpensive solar ovens.

Gas Stoves An example of an environmentally-sound business initiative has been set by the Vere Agencies in May Pen which sell a gas stove and a cylinder of gas for J\$1600 in return for a coal stove.

Water Hyacinth Numerous commercial uses of water hyacinth have been developed in countries suffering from infestations of the weed. The dried fibers make strong rope and has been used in the manufacture of designer furniture and a variety of craft objects. The cost of collecting and drying large volumes of water hyacinth would require very high value added in order to produce a commercial return. However, the versatility of the plant could offer profitable ways of keeping down the infestation while efforts are made to control the causes.

7.7 Priority Cooperative Agreements

7.7.1 Commitment to Environmental Policy Framework and Principles of Cooperation

Participants in the Environmental Policy Framework process need to review and commit to the Framework for Implementation and Principles of Cooperation presented in Sections 6.5 and 6.6 of this draft EPF.

7.7.2 Cooperative Agreements with Special Local Interests

The NRCA should seek Cooperative Agreements with or among critical interests and groups. The following groups and subjects should be regarded as priorities (see Annex I, Model Cooperative Agreements) but are not the only subjects.

- **Appleton** The highest priority should be given to concluding a Cooperative Agreement with the Appleton Rum Distillery to eliminate or significantly reduce the environmental impact of industrial effluents from this plant. Discussions have been conducted with the through the industry's watchdog organization, the Spirits Pool Association and this may still be the best avenue to achieving a firm commitment. The Agreement should resolve the issue of contamination of the Black River as a result of the manufacturing process. Specific mitigation measures should be suggested to reduce the impact of aspects of the process itself (such as the washing of cane) as well as discharge of dunder and other effluents, including oils and acids. The Agreement should formalized the schedule for installation a biodigester and/or further research into the potential for sustainable energy generation and other alternative uses of dunder, including monitoring and regulatory action. The potential to introduce anti-pollutant microorganisms should also be investigated (see Annex I, Priority Cooperative Agreements).
- **St Elizabeth Parish Council** The Parish Council's development policy may impact on proposed Protected Areas and the quality of their environs. The Council should enter into an agreement with the Town Planning Department, the NRCA and the Commissioner of Lands regarding
 - Initiating preparation of an updated Development Plan and Order consistent with the goals and objectives of the EPF, identifying areas outside the proposed Protected Area(s) deemed suitable and unsuitable for development,
 - Criteria and procedures for the subdivision of land and granting planning permission,
 - The potential for introducing innovative procedures such as conservation easements and transfer or consolidation of land development rights,
 - Agreement on and control of the direction of expansion of the towns of Black River and Santa Cruz towns, and
 - The potential to declare the town of Black River a National Heritage Site or National Monument should be explored in partnership with the Jamaica National Heritage Trust.

- **South Coast Resort Board** Partnership between NRCA and SCRB will be important in promoting sustainable tourism in St Elizabeth, and may lead to a more effective natural resource management regime for the area. The Board has a clear incentive to promote environmental conservation. Specific ecotourism initiatives may include Nature Trails (Great Bay, Font Hill), Visitors' Information Centres (Black River, Bamboo Avenue), Ornithology (Slip, Great Bay), and Rafting (Middle Quarters, Vineyard). Cooperation between Community Organizations and SCRB should be encouraged. A Cooperative Agreement between SCRB and NRCA should also require the Board to conduct feasibility studies prior to developing and marketing eco-tourism activities in the proposed Protected Area.
- **YS Falls** YS Falls is a privately owned and operated eco-tourism attraction which is managed with the aim of keeping visitor numbers below a limit based on visual carrying capacity. The attraction is closed on weekends and holidays when numbers would exceed the desired capacity and resident entry fees are beyond the reach of many Jamaicans. If the falls were to be incorporated within a protected area, the attraction would benefit from the added publicity. In return, a co-operative agreement with the NRCA might call for a weekend and holiday reservation system together with an expanded sliding fee scale in order to increase its accessibility to resident families. The possibility of donation boxes, with proceeds going to Protected Area management, should also be investigated.
- **Tour Boat Operators** NRCA will develop a policy for river use based on the recommendations of a recent carrying capacity and environmental impact assessment sponsored by the Tourism Product Development Company (TPDCo). In implementing that policy and licensing tour boat operators, operators may be required to enter into an agreement with the NRCA (possibly in collaboration with TPDCo) that would commit them to abide by the terms of the policy. Special importance should be attached to speed limits, engine maintenance to limit oil pollution, and noise reduction. The impact of tours on critical bird and fish habitats should be mitigated by diversion of routes and other measures. Licences should be renewed annually and the policy enforced.
- **Petroleum Corporation of Jamaica (PCJ)** PCJ should commit itself to the environmental protection of the Font Hill Reserve. This may include the leasing of land to small-scale farmers on condition of good practice and the dedication of areas of special scientific interest as nature reserves. Under the terms of the Agreement, PCJ should be held accountable for any pollution of the beach (and therefore for monitoring water quality on a regular and approved basis) and for ensuring that the overall quality of the beach and reserve are maintained in at least their current condition, if not enhanced. This would require PCJ to commit to special measures to protect the well-being of nesting turtles at Font Hill Beach, crocodiles in the reserve, seagrass beds and coral reefs, and vegetation throughout the property. It would therefore need to monitor conditions to determine the need for a carrying capacity study and to register reactions to the level of development of the beach and reserve.
- **St Elizabeth Dairy Cooperative** A Cooperative Agreement with the Dairy Cooperative's members should include guidelines on agro-chemical application and carrying capacities of land. A Code of Good Practice should be developed for the 15 members who farm inside the Protected Area.
- **Mining Interests** Agreements should be sought with the Division of Mines and Quarries, the Public Works Department, West Indies Glass (silica mining interests), Cement Works, and the bauxite industry and JBI. Commitment to more effective measures and to respecting the land (and other) rights of the local population is appropriate. An environmental impact assessment should be completed with full public participation before any mining is permitted in the Santa Cruz Mountains, in order to allow a review of the comparative environmental and economic benefits of mining versus the sustainable use of the mountains for other natural resources such as mahogany.

7.8 Summary of Recommended NRCA Priority Actions

NRCA policy endorses the EPF process as the first step in establishing Protected Areas and as a desirable approach to identifying environmental conditions and involving stakeholders in planning and intervention. The process itself encourages popular participation in the creation of Protected Areas and the management of surrounding areas and therefore contributes to the sustainability of a protected area's environmental quality. In collaboration with stakeholders, the NRCA's Black River Team has prepared this draft EPF and progressed towards the goal of Protected Area declaration. Further momentum will be added by NRCA and stakeholder endorsement of the process as a whole, refinement and adoption of the document and action towards the following specific activities:

The following immediate (emergency) actions and longer-term actions are recommended:

- Open the first NRCA regional office in Black River and begin a program of priority activities,
- Achieve consensus on the EPF document and Action Plan (NRCA lead in association with one or more local organizations),
- Obtain new air photo coverage and update maps, Update ownership information and prepare maps,
- Prepare detailed Environmental Assessment of the Black River Upper Morass,
- Achieve declaration of and development management plan(s) (including species action plans) for the first Protected Area(s),
- Negotiate and enter into priority cooperative agreements (NRCA and/or local organization lead),
- Build institutional strength for environmental management (NEST lead),
- Undertake environmental and economic improvement projects (NRCA guidance and environmental review),
- Foster formulation, adoption and enforcement of appropriate regulations (NRCA lead),
- Add wardens for critical coastal, wetland and forest areas,
- Design a program of Environmental Education focused on St Elizabeth and drawing on the Survey of Environmental Awareness and the Environmental Policy Framework
- Develop a program of environmental sensitization for the Judiciary,
- Ensure preparation of comprehensive sanitation plan
- Continue Community Outreach with NEST
- Obtain greater collaboration of stakeholders in development planning and expand participation in the EIA process (NRCA lead),
- Expand Black River Carrying Capacity Study,
- Make a determination about the location of a central environmental data base

CONCLUDING STATEMENT The Natural Resources Conservation Authority recognizes the need for more in-depth collaborative arrangements in the efforts to ensure a sustainable development path for Jamaica. We therefore invite the full participation of other agencies of government in this process of environmental management in St Elizabeth, and we hope the objectives set out in this document can be realized in the near future.